3. *The Fresh-water Entomostraca of the Cape Province* (*Union of South Africa*).—By G. O. Sars. Part III : Copepoda.

(With Plates V–XVI.)

INTRODUCTION.

In two previous papers I have given an account of the South African species belonging to the orders *Cladocera* and *Ostracoda* as yet examined by me, most of these species having been observed in the living state by breeding from dried mud. I now propose to deal with another order of Entomostraca, viz. the *Copepoda*, which is also well represented in the South African Fauna. Of this order in all twenty-three species have been subjected to a closer examination ; but of these only three have been raised from dried mud, all the others are exclusively derived from gatherings, preserved in alcohol, taken at different times partly in the neighbourhood of Cape Town by the late Dr. Purcell, partly in other localities in the Cape Province. Three new species from South-West Africa are also included.

The species recorded in the present paper belong to the three leading divisions of free-living *Copepoda—Calanoida*, *Cyclopoida*, and *Harpacticoida* ; but of the last-named division only quite solitary specimens of two species have as yet come under my notice, whereas the two other divisions are rather abundantly represented, although the species only belong to one family of each, viz. *Diaptomidae* and *Cyclopidae*. Four of the Diaptomid species here recorded have been previously described by the present author in other Journals, but I have thought it advisable to redescribe these interesting forms, and to give new and more carefully drawn figures of each.

Division CALANOIDA.

Fam. DIAPTOMIDAE.

Gen. LOVENULA, Schmeil.

Syn. : Broteas, Lovén.

Remarks.—This genus was established as early as the year 1845 by Lovén, and was referred by him to the family *Cyclopidae*, this family

being at that time taken in a much wider sense than at present. As, however, the name *Broteas*, given to the genus by Lovén, had proved to be preoccupied by Koch for a genus of Arachnidae, Dr. Schmeil proposed in the year 1898 to change it as above. The genus is apparently allied to *Diaptomus*, from which it, however, differs essentially in the powerfully developed posterior maxillipeds, and in the tail of the female being only composed of 2 segments. From the succeeding genus, which approaches it rather closely, it differs in the general shape of the body, as also somewhat in the structure of the appendages, particularly in that of the maxillae and the posterior maxillipeds. Two nearly allied species of this genus will be described in the sequel, one of them being that originally observed by Lovén, the other having recently been detected by Mr. Barnard in South-West Africa.

1. Lovenula falcifera (Lovén).

(Plate V; Plate VI, figs. 1–5.)

Broteas falcifer, Lovén. Kql. Svenska Vetensk. Acad. Handlinger, 1845, p. 436, pl. vi.

Broteas falcifer, G. O. Sars. Arch. f. Mathem. u. Naturvidenskab, vol. xxi, No. 2, p. 22, pl. iv.

Distinctive Characters.—Length of female reaching to near about 5 mm. Body elongate, with well-marked constrictions between the segments. Front rather contracted. Lateral lobes of last pedigerous segment broadly triangular and conspicuously asymmetrical. Genital segment more protuberant on right side than on left, and much shorter than the anal segment. Anterior antennae about the length of the anterior division of the body. Posterior maxillipeds with the terminal spines very coarse, falciform. Right last leg of male with the distal joint of outer ramus gradually somewhat narrowed, outer-edge spine well developed, apical claw very strong, flexuous; terminal part of left leg imperfectly subdivided, apical lappet and outer-edge spine not far remote from each other, both deflexed.

Description of the Female.—The body (see figs. 1 and 2) is rather robust, though somewhat elongate, with the two chief divisions sharply marked off from each other. The anterior division is almost cylindrical in shape, being scarcely broader in front than behind, and has the segments defined laterally by well-marked constrictions. The foremost segment, constituting the head, attains nearly the length of the 3 succeeding segments combined, and contracts rapidly towards the end, which in the dorsal view of the animal (fig. 1) appears

narrowly rounded. In a lateral aspect (fig. 2) the frontal part of the head is seen to project a little beyond the insertion of the anterior antennae, terminating below in a short protuberance evidently replacing the rostrum in other Calanoida. The protuberance is, however, quite simple, without the slightest trace of any appendages on the obtuse tip. The last pedigerous segment is imperfectly defined from the preceding one, though a slight lateral impression indicates the limit between the 2 segments. It is deeply emarginated in the middle, and projects to each side of the emargination in a broadly triangular lobe pointing obliquely behind. On a closer inspection these lobes are found to be pronouncedly asymmetrical, the left lobe being constantly larger and deeper than the right.

The tail scarcely exceeds half the length of the anterior division, and is more generally turned a little to left side. It is only composed of 2 segments, the 1st of which (the genital segment) is slightly dilated in front of the middle, and, seen from above, somewhat asymmetrical in shape, the right side being conspicuously more protuberant than the left. The 2nd segment is considerably more prolonged than the 1st, and gradually widens somewhat distally, being transversely truncated at the end. It exhibits dorsally, in some distance from the extremity, a short transverse fold or opercle arching over the anal opening. The caudal rami (see fig. 12) are about twice as long as they are broad at the base, and somewhat narrowed distally, being scarcely at all divergent. The marginal setae are present in the usual number, 2 of them being attached to the outer edge, the other 3 to the tip. They are all comparatively short, but rather thick, and densely plumose, those on the outer edge considerably curved. In addition to these setae, a thin bristle is seen attached to the dorsal face of each ramus near the inner distal corner. The inner edge of the rami is perfectly straight, and throughout fringed with fine cilia.

The ovisac (see fig. 1) is of moderate size, and almost circular in outline, containing numerous densely crowded ova.

The anterior antennae (fig. 3) are rather slender, though scarcely exceeding the length of the anterior division of the body, and gradually taper distally. They are composed of the usual number of joints, viz. 25, and are clothed anteriorly with scattered setae of very unequal length, some of them being considerably prolonged and curved in different directions. Of the joints the first 2 are rather larger than the others, which successively increase in length. The 3 outermost joints are, however, again somewhat shorter, and the last joint is the smallest of all.

The posterior antennae (fig. 4) are comparatively of rather small size, with the outer ramus scarcely longer than the inner, and much thinner. It is composed of 7 joints, the 2nd of which is the largest, and somewhat swollen, whereas the 4 succeeding joints are extremely small and combined about the length of the terminal joint.

The mandibles (fig. 5) have the body well developed, with the masticatory part expanded in the usual manner and coarsely dentate at the extremity. The palp is, however, poorly developed, though otherwise of normal appearance.

The maxillae (fig. 6) exhibit all the constituent parts distinctly developed, and are in particular distinguished by the terminal joint of the palp being considerably produced and tipped with a number of very long setae curving outwards. The exopodal lobe is comparatively small and narrow oblong in shape.

The anterior maxillipeds (fig. 7) are rather strongly built, each forming a thickish anteriorly curving stem divided into two well-marked sections, a basal and a terminal. The basal section is almost of equal width throughout, and exhibits traces of a subdivision in its distal part. Anteriorly it is provided with 4 short digitiform lobules, each armed, in addition to the setae, with a coarse curved spine. The first joint of the terminal section is conspicuously constricted at the base, but widens gradually towards the end, its distal corner being somewhat produced and armed with a spine similar to those on the lobules of the basal part, accompanied by 2 slender setae. The 3 outer joints are very short and densely crowded, being armed with strong anteriorly curving spines.

The posterior maxillipeds (fig. 8) are highly distinguished by their extraordinarily strong development, being almost three times as long as the anterior ones, and constituting very powerful preying organs. The 2 basal segments are much prolonged, in particular the distal one, in which 2 strong muscles are seen joining the terminal part, one of them (the flexor) being in particular very powerful, and attached with its extremity to a strong chitinous tendon entering the terminal part at the flexure between it and the basal part, and continued almost to the end of the former. The terminal part is comparatively short, scarcely attaining half the length of the 2nd basal segment, but is rather thick and highly chitinised, being generally found closely bent upon the basal part in front. It is only composed of 4 joints, the last of which is very small, so as easily escaping attention. To the inner side of this part several curved setae of unequal length are attached, and from the end project 3 particularly strong and closely juxtaposed

falciform spines slightly curved in their outer part, and distinctly denticulated inside. At the first sight all 3 spines appear to issue from the very apex ; but it is easily proved on a closer examination that in reality only one of the spines is attached to the last joint, whereas the other two take their origin each from one of the 2 preceding joints.

The natatory legs (figs. 9 and 10) are on the whole built on the same type as in *Diaptomus*, though some minor differences may be found in their details.

The 1st pair of legs (fig. 9) are considerably smaller than the succeeding ones, and have the inner ramus only composed of 2 joints. The outer ramus exceeds the inner in length, and is distinctly triarticulate, with the 1st joint somewhat dilated and armed at the end outside with a long deflexed spine densely hairy on the inner side. The middle joint is abruptly much narrower, and without any trace of a spine outside. The last joint is still narrower and somewhat more elongate, being provided in its outer part with 2 very small but distinctly denticulate outer-edge spines. The apical spine of this joint is very slender, almost setiform, and apparently quite naked.

The 3 succeeding pairs of legs (fig. 10) are all of quite uniform structure, with both rami distinctly triarticulate. The outer ramus is considerably more elongate than the inner, and also more strongly built, with a well-developed denticulated outer-edge spine on each of the 2 proximal joints. The terminal joint of this ramus is unusually narrow, and has only a single comparatively small outer-edge spine attached close to the tip. The apical spine, however, is very fully developed, nearly attaining the length of the whole ramus. It is sabre-shaped, and densely fringed along the outer edge with slender spinules in a pectinate manner.

The last pair of legs (fig. 11) are very unlike the preceding ones, and on the whole agree in structure with those legs in *Diaptomus*, though being comparatively more robust. The proximal joint of the outer ramus is rather large and of uniform width throughout. The distal joint is, on the other hand, comparatively small, and apparently terminates in 3 somewhat diverging stout spines. The innermost and strongest of these spines forms, however, the immediate continuation of the joint, and evidently answers to the terminal claw in *Diaptomus*. The middle spine, too, which generally is abruptly incurved, so as crossing the base of the claw, is unquestionably identical with the small apical joint found in most species of the genus *Diaptomus*. The inner ramus is poorly developed, forming a simple narrow

cylindrical appendage extending alongside the outer ramus and scarcely reaching as far as the proximal joint of that ramus. It carries on the tip 2 comparatively short spines, but is otherwise quite unarmed.

Description of the Male.—In size the male is only slightly inferior to the female. It is, however, readily recognised by the usual sexual particularities, which in the present form are rather sharply marked. The body (see Pl. VI, fig. 1) appears on the whole more slender than in the female, with the anterior division conspicuously contracted behind, and the lateral lobes of the last segment very much reduced in size and scarcely at all asymmetrical.

The tail is very narrow and cylindrical in shape, being also considerably more prolonged than in the female. It is composed of 5 distinctly defined segments, the 1st of which is quite short and slightly protuberant on the left side, where the genital orifice is situated. To this orifice leads a rather long and roomy duct passing through the posterior part of the anterior division, and often containing a fully developed spermatophore, easily observed in specimens cleared up by immersion in glycerin (see fig. 1). The caudal rami (see fig. 5) are conspicuously asymmetrical, the right being somewhat longer than the left and bent more outwards. This ramus is, moreover, distinguished by a peculiar transformation of the 3 outermost setae, which are much stronger than the others, almost spiniform, and quite destitute of the usual dense ciliation.

The right anterior antenna (fig. 2) is, as usual, very unlike the left, being transformed to a powerful prehensile organ. It exhibits 3 well-marked successive sections of almost equal length, but rather dissimilar in appearance. The proximal section, comprising the first 12 joints, resembles on the whole the corresponding part of the left antenna, except that the 7th joint is somewhat larger, and that the penultimate one is produced in front to a coarse spiniform process. The middle section is, however, considerably swollen, oblong fusiform in shape, and traversed by a strong transversely striated muscle acting upon the terminal section. It is composed of 6 well-defined joints firmly connected with each other, the last 2 joints having each in front a somewhat spiniform lamella closely appressed to the anterior edge. The terminal section is a little shorter than the middle one, and very much narrower, being very mobile, so as allowing to be bent in front upon the adjacent part of the antenna. It is only composed of 3 joints successively diminishing in size, the first highly chitinised and armed in front with an appressed spine, the last produced at the

end to a short hook-like process, at the base of which several thin setae are attached (see fig. 3).

The posterior antennae, oral pieces, and natatory legs are exactly of same structure as in the female.

The last pair of legs (fig. 4), however, are much transformed and very powerfully developed, being adapted for prehension. They are conspicuously asymmetrical, the right leg being much larger than the left and of a very different appearance. On both legs a biarticulate basal part may be distinguished, and on the right leg also 2 rami, the inner of which, however, is very small, forming a narrow rod-like appendage terminated by a minute knob-shaped joint. The outer ramus of this leg, on the other hand, is very largely developed, and composed of 2 well-defined thickish joints, the last of which is the larger, and slightly tapered towards the end, with the inner edge almost straight, the outer gently curved. Outside this joint, near the apex, a well-defined though rather short spine is attached, and to the tip is movably articulated an exceedingly strong, somewhat flexuous claw finely denticulated in its outer part. The left leg is scarcely more than half as long as the right, and does not exhibit any trace of an inner ramus, the basal part being followed by a somewhat flattened and imperfectly subdivided piece terminated by a narrowly rounded lappet. Outside the base of this lappet a strong deflexed spine is attached, issuing from a knob-like prominence and accompanied inside by a slender seta.

Remarks.—This form, as mentioned above, was described in the year 1845 by Lovén as the type of his genus *Broteas*, but as our knowledge of the *Copepoda* at that time was still very imperfect, the description given by Lovén, though rather exhaustive, could not of course suffice for ascertaining the true systematic relation of this copepod to the other known forms, and it even appeared somewhat questionable if it could be classed at all among the fresh-water *Copepoda*. In any case, a renewed examination of this form seemed to be highly desirable. It was therefore of great interest to me to receive in the year 1898 from Dr. Purcell several well-preserved specimens of a large-sized Calanoid, in which I very soon recognised the form originally described by Lovén. The specimens were at once submitted to a careful anatomical examination, and a detailed description accompanied by figures given in the above-quoted Journal. I was thereby enabled to ascertain the near relationship of this form to the genus *Diaptomus*, and at the same time to point out some apparently essential differences sufficient to support the genus proposed by

Lovén. The present form is one of the largest known fresh-water *Copepoda*, and is in this respect scarcely rivalled by any other, except perhaps the huge *Diaptomus superbus*, Schmeil.

Occurrence.—The specimens originally examined by Lovén were collected by J. Wahlberg from a so-called salt-pan or small saline marsh in the neighbourhood of Port Natal. Those in my possession were taken by the late Dr. Purcell in two different places on Green Point Common, near Cape Town, and apparently in pure fresh water. The colour of the living animal is bluish, the antennae and tail red.

2. Lovenula barnardi, n. sp.

(Plate VI, figs. 6–9.)

Distinctive Characters.—Length of female scarcely exceeding 4·40 mm. Body less elongate than in the type species, with no obvious constrictions between the segments. Frontal part less contracted. Lateral lobes of last pedigerous segment less prominent and only slightly asymmetrical, each terminating in a sharp point. Genital segment more protuberant on left side than on right, and not at all shorter than the anal segment. Anterior antennae exceeding somewhat in length the anterior division of the body. Posterior maxillipeds with the terminal spines less strong and scarcely falciform. Right last leg in male with the distal joint of outer ramus conspicuously bulging inside, outer-edge spine rudimentary, apical claw evenly curved; terminal part of left leg distinctly subdivided, distal joint transverse, with the apical lappet turned inwards and the outer-edge spine exceedingly large and extant.

Description of the Female.—The body (see figs. 6 and 7) appears comparatively shorter and more compact than in the type species, with the anterior division rather more dilated, and not exhibiting any conspicuous constrictions between the segments. The cephalic segment is more evenly contracted anteriorly, with the frontal part, seen laterally, less narrow. The last pedigerous segment is almost completely confluent with the preceding one, and has the lateral lobes comparatively shorter than in the type species, and only slightly asymmetrical, each terminating in a somewhat extant sharp point.

The tail is comparatively short, only slightly exceeding in length $\frac{1}{3}$ of the anterior division, and differs conspicuously from that in the type species in the shape and mutual relation of its 2 segments. The genital segment, as in that species, is pronouncedly asymmetrical, but the asymmetry is the opposite of that found in *L. falcifera*, the

left side, and not the right, being the more protuberant. The distal, or anal segment is comparatively much shorter than in the said species, scarcely attaining the length of the genital segment, its greatest width being about equal to half the length. The caudal rami resemble in shape those in the type species, but the marginal setae are considerably more produced.

The ovisac (see fig. 6) is rather large, rounded oval in outline, and projecting beyond the tips of the caudal rami.

The anterior antennae (see figs. 6 and 7) are comparatively more prolonged than in the type species, exceeding somewhat in length the anterior division of the body. In structure, however, they perfectly agree with those in the said species.

The succeeding appendages also are so very like those in *L. falcifera*, that I think I may dispense myself from giving any detailed description of them. I only will note that the 3 terminal spines on the posterior maxillipeds are less coarsely developed, so as not properly to be called falciform.

The last pair of legs (fig. 8), though built upon the very same type as in the preceding species, appear somewhat less robust, with the proximal joint of the outer ramus conspicuously narrower, and the outer-edge spine of the distal joint more extant.

The *male* differs from the female in a very similar manner to that of the type species.

Yet the last pair of legs (fig. 9) exhibit some well-marked differences in their details, both as regards the right and the left leg. In the former the distal joint of the outer ramus is comparatively shorter and scarcely at all narrowed, its inner edge being considerably bulged. The outer-edge spine of this joint seems at first sight to be wholly wanting, and it is only on a very careful examination that an extremely small rudiment of this spine is detected close to the apex. The apical claw is less strong than in the type species, and evenly curved in its outer part. The left leg has the terminal part divided into 2 sharply defined joints, the distal one short and broad, transverse, or somewhat securiform in shape, with the inner corner produced to an inward-pointing digitiform lappet, the outer passing gradually over into an exceedingly coarse and extant spine curved downward and, as in the male of *L. falcifera*, exhibiting at the base a well-marked transverse suture. In the middle between this spine and the inner digitiform lappet a thin seta is seen, springing off from a small knob-like prominence.

Remarks.—The above-described form is closely allied to *L. falcifera*,

so closely, indeed, that at first I took it to be the very same species. A closer examination of the specimens has, however, proved it to be in reality a well-defined new species, to which the name of its collector may properly be applied.

Occurrence.—Numerous specimens of this form, all perfectly agreeing with each other, were collected by Mr. Barnard at six different places in Ovamboland, South-West Africa. According to the notes given by the collector, the colour of the living animal was bluish, the tail being, however, tinged with red.

Gen. PARADIAPTOMUS, G. O. Sars.

Syn. : Broteas, G. O. Sars (in part).

Remarks.—This genus was proposed in the year 1895 by the present author to include a peculiar South African Diaptomid raised by him from dried mud. The genus was, however, subsequently (in the year 1898) withdrawn, as I believed, at that time, that the said Diaptomid should more properly be referred to the genus *Broteas* of Lovén. Yet at present I have come to the conclusion that the genus *Paradiaptomus* in reality ought to be supported, as it exhibits some rather striking differences from both of the two species of Lovén's genus described above.

The chief characters distinguishing the present genus refer to the peculiar appearance of the tail in the female and to the structure of some of the appendages, in particular that of the maxillae and the posterior maxillipeds.

3. Paradiaptomus lamellatus, G. O. Sars.

(Plate VII.)

Paradiaptomus lamellatus, G. O. Sars. Chr. Vid. Selsk. Skrifter, 1895, No. 3, p. 46, pls. vii, viii.

Broteas lamellatus, G. O. Sars. Arch. f. Mathem. u. Naturv., vol. xxi, No. 2, p. 24.

Description of the Female.—The length of the body scarcely exceeds 3·90 mm., and this form accordingly does not by far grow to such a large size as the two above-described species of the genus *Lovénula*.

In the living animal the body is semipellucid, of a light bluish grey colour, with the hind edges of the segments somewhat darker, and the outer part of the tail almost colourless.

The general shape of the body (see figs. 1 and 2) looks rather unlike

that in the species of the preceding genus, being unusually short and stout, with the anterior division considerably inflated in its anterior part and gradually contracted behind. The cephalic segment is highly vaulted dorsally, with the frontal part evenly rounded off anteriorly and terminating below in a small simple rostral protuberance. The last pedigerous segment, as in *Lovenula*, is almost entirely confluent with the preceding segment, and has the lateral lobes rather prominent, narrow lanceolate in shape, and perfectly symmetrical.

The tail is about half the length of the anterior division and, as in *Lovenula*, only composed of 2 segments ; but the shape of these segments is rather unlike that in the said genus. The genital segment is somewhat produced, and does not exhibit any obvious asymmetry, being quite uniformly dilated in its anterior part and rather protuberant below. It tapers somewhat towards the extremity, which forms a very movable articulation with the anal segment. The latter is a little shorter than the genital segment and of a very dissimilar appearance, being pronouncedly flattened and greatly expanded towards the end, so as exhibiting, seen dorsally, the form of an equilateral triangle. It is transversely truncated behind, and provided dorsally, at some distance from the end, with a well-marked anal opercle. The caudal rami also exhibit a very strange appearance, unlike that met with in any of the other known *Diaptomidae*. They are of comparatively large size, fully equalling in length the anal segment, and have the form of 2 closely juxtaposed, broadly oval lamellae, with the inner edge perfectly straight, the outer gently curved. The marginal setae are present in the usual number, viz. 5 on each ramus, one of them attached to a well-marked ledge of the outer margin. All the setae are finely ciliated, but remarkably short, with the base bulbously dilated and the extremity drawn out to a very thin lash. The innermost but one is, as usual, the longest, though scarcely attaining the length of the corresponding ramus. The dorsal bristle, attached near the inner corner, is very small.

The ovisac is in most cases not very large, scarcely extending beyond the anal segment, and is almost circular in outline.

The eye is very small and, as in the species of *Diaptomus*, situated somewhat ventrally, at some distance behind the rostral protuberance.

The anterior antennae (fig. 3) are comparatively short, not nearly attaining the length of the anterior division of the body. They are, however, composed of the usual number of joints (25), and are rather densely setiferous ; but none of the setae are, as in *Lovenula*, particularly prolonged.

The posterior antennae (fig. 4) are far less reduced in size than in *Lovenula*, though exhibiting a rather similar structure. The terminal joint of the outer ramus is, however, much shorter than in either of the two species of that genus.

The mandibles (fig. 5) do not differ from those in *Lovenula*, except by the palp being more fully developed.

The maxillae (fig. 6), however, are prominently distinguished by the rudimentary condition of the terminal joint on the palp, this joint being, unlike what is the case in *Lovenula*, very small, nodiform, and only clothed with quite short setae. The exopodal lobe also is rather different in shape, being comparatively larger and somewhat expanded distally.

The anterior maxillipeds (fig. 7) are less robust than in *Lovenula*, but otherwise of a very similar appearance.

The posterior maxillipeds (fig. 8), however, look very different, being far less powerfully developed, and more resembling in structure those appendages in *Diaptomus*. Yet the terminal part is comparatively shorter and thicker than in that genus, with the setae partly converted to spines, one of these, projecting from the tip, being in particular rather strong and distinctly denticulate, though scarcely at all curved. The number of joints in this part is also reduced, only 4 joints being counted, the last extremely small.

The natatory legs (figs. 9 and 10), though having a similar jointing to those in *Lovenula*, exhibit a rather unlike appearance, being much shorter and stouter, with the rami comparatively broader and less unequal in length. The outer ramus in particular looks very dissimilar to that in *Lovenula*, its terminal joint being not at all narrowed, and the apical spine much shorter and of the very same structure as the other spines on this ramus.

The last pair of legs (fig. 11) resemble in general those in *Lovenula*, but are comparatively shorter and stouter, and differ, moreover, in the stronger development of the terminal claw, as also in the comparatively smaller size of the inner ramus.

The *male* (fig. 12) is not much inferior in size to the female, but is easily recognisable by the rather strongly marked sexual differences.

The anterior division of the body is, as in the female, considerably inflated, with the dorsal face evenly vaulted throughout. The lateral lobes of the last segment are, however, so much reduced as to be almost quite obsolete.

The tail looks very different from that in the female, being narrowly cylindrical in shape, and composed of 5 well-defined segments, none

of them exhibiting any obvious particularity in their structure. The caudal rami (fig. 14) also are very unlike those in the female, being much narrower and scarcely at all lamelliform. On a closer examination they are found to be somewhat asymmetrical, the right ramus being a little smaller than the left and more extant, with the outermost seta conspicuously thickened and spiniform. The other marginal setae are of quite normal appearance, and considerably more prolonged than in the female.

The right anterior antenna (see fig. 12) has the middle section considerably tumified, more so than in either of the two species of *Lovenula* described above. The terminal section is, however, comparatively short, and without any hook-like projection at the tip.

The last pair of legs (fig. 13), though at first sight rather like those in *Lovenula*, are found, on a closer examination, to exhibit some well-marked differences in their details. The right leg is rather strongly built, with the distal joint of the outer ramus comparatively large and broad at the base, being armed outside near the end with a rather strong spine. The apical claw is of moderate size and quite evenly curved throughout. The left leg is in particular distinguished from that in *Lovenula* by the presence of a distinctly defined inner ramus of simple conical shape, attached to the basal part in the usual place. The outer ramus of this leg, answering to the terminal part in *Lovenula*, is imperfectly subdivided, with the distal joint abruptly inflexed and somewhat boot-shaped, being armed outside with a thin deflexed spine. Another much coarser spine is seen originating from the outer side of the proximal joint, somewhat inside the edge, and abruptly bent at the base.

Remarks.—As above mentioned, this form was described as early as the year 1895 by the present author as the type of his genus *Paradiaptomus*, but was subsequently, in 1898, briefly characterised under another name, viz. *Broteas lamellatus*, owing to the author's opinion at that time that it was referable to Lovén's genus. It is an easily recognisable form, being in particular highly distinguished by the peculiar structure of the tail in the female, this character having indeed given rise to the specific name proposed. As it is the only as yet known species of the genus, any precise distinctive diagnosis cannot of course be given.

Occurrence.—The specimens originally examined by the present author were raised from dried mud taken by Mr. Thesen at Knysna on the south coast of the Cape Province. Several years afterwards I received from Dr. Purcell numerous well-preserved specimens of the

same interesting Diaptomid collected from ponds on Green Point Common, near Cape Town, and a few specimens were also raised from a parcel of mud derived from the same locality.

Gen. DIAPTOMUS, Westwood.

Remarks.—This genus comprises a vast number of species from nearly all parts of the world. As, however, some of these species apparently diverge more or less conspicuously from the usual type, it is most likely to believe that a subdivision of the genus will be found to be requisite in future. Of the four South African species described in the sequel, only the last (*D. congruens*) shows itself as a genuine member of the genus. The other three diverge in some particulars rather conspicuously, as seen from the descriptions here given.

4. Diaptomus capensis, G. O. Sars.

(Plate VIII, figs. 1–12.)

Diaptomus capensis, G. O. Sars. Arch. f. Mathem. u. Naturvidenskab, vol. xxviii, No. 8, p. 4, pl. i ; pl. ii, figs. 1 and 2.

Distinctive Characters.—Length of female, 1·90 mm. Body comparatively short, with the frontal part of head remarkably vaulted dorsally. Lateral lobes of last pedigerous segment obtusely triangular and scarcely extant. Genital segment remarkably asymmetrical and scarcely longer than the 2 succeeding segments combined. Ovisac oblong oval. Anterior antenna much shorter than the anterior division of body. Last pair of legs rather narrow, with the inner ramus attenuated and tipped with 2 slender setae. Right last leg in male much produced, with the 2nd basal segment remarkably expanded inside ; proximal joint of outer ramus provided at the end inside with a well-marked spiniform process, distal joint large, with the outer edge evenly curved and quite unarmed, inner ramus biarticulate. Left leg without any inner ramus, distal part comparatively small, terminating in a triangular-pointed lappet, outside which a digitiform appendage is attached.

Description of the Female.—In general appearance this form looks rather unlike most other known species of the present genus, the body (see figs. 1 and 2) being rather short and stout, with the anterior division of almost uniform width throughout and somewhat compressed. The cephalic segment is about the length of the 2 succeeding segments combined, and, seen dorsally (fig. 1), obtusely rounded at the extre-

mity. It is remarkably vaulted dorsally, in such a manner that the head, seen laterally (fig. 2), appears almost transversely truncated in front. Below it is produced to a well-marked rostral protuberance tipped with 2 very small recurved tentacular appendages. The last segment is completely coalesced with the preceding one, no trace of any defining suture or lateral impression between them being visible. It is deeply emarginated in the middle, and projects on each side of the emargination in the form of an obtusely-pointed triangular lobe extending straight behind. The 2 lobes are slightly asymmetrical, the left lobe being a little larger than the right.

The tail is comparatively short, scarcely exceeding in length $\frac{1}{3}$ of the anterior division, but is divided into 3 well-defined segments. The first of these segments, the genital one, is the largest, though scarcely exceeding in length the other two combined. It is highly distinguished by its very strongly marked asymmetry, exhibiting in the dorsal aspect a rather oblique suboval shape, with the right side strongly bulged in its whole extent, whereas the left side is somewhat flattened and only close to the base a little protuberant. The caudal rami are comparatively short, suboval in shape, and scarcely at all divergent. On a closer examination they are found to be slightly asymmetrical, the right ramus being constantly somewhat broader than the left. The marginal setae are of moderate length, one of them being attached to the outer edge, the other four to the obtusely rounded extremity.

The ovisac is oblong oval in outline, and extends considerably beyond the caudal rami.

The colour of the living animal, as ascertained in some specimens reared from dried mud, is clear yellow tending to light chestnut.

The eye is rather small and situated a little inside the rostral protuberance.

The anterior antennae (fig. 3) are comparatively short, not nearly attaining the length of the anterior division of the body. They are composed of the usual number of joints (25) densely clothed with rather strong subequal setae.

The posterior antennae (fig. 4) have the outer ramus well developed and considerably longer than the inner, being composed of 7 joints, the 3rd to 6th quite short, the last rather prolonged, exceeding in length those joints combined.

The mandibles (fig. 5) exhibit the usual structure, the masticatory part being defined by a well-marked collar and securiform expanded at the end, with the outermost dent of the cutting edge very large

and separated from the others by a deep sinus. The palp is about the length of the body of the mandible, and likewise of quite normal appearance.

The maxillae (fig. 6) have all the constituent parts distinctly defined, the outer part of the palp being faintly divided into 3 successive joints, gradually diminishing in size and densely fringed with finely ciliated setae of about equal length. The exopodal lobe is of moderate size, and provided with 7 more densely ciliated setae.

The anterior maxillipeds (fig. 7) are of comparatively small size, and have none of the setae pronouncedly spiniform, those of the terminal part being rather slender and densely crowded.

The posterior maxillipeds (fig. 8) are considerably more prolonged, but of rather feeble structure. The proximal segment of the basal part is about of same length as the distal one, but considerably broader and somewhat lamellar. It is provided anteriorly with several slender setae, and projects at the end to a narrow lobe finely ciliated on the tip. The terminal part is very narrow and composed of 5 well-defined joints clothed with weak setae, those issuing from the extremity more or less recurved and finely ciliated.

The natatory legs (figs. 9 and 10) resemble in their general structure those in the genus *Lovenula*, though being somewhat less elongate, with the apical spine of the outer ramus much shorter and less coarsely spinulose outside.

The last pair of legs (fig. 11) are of comparatively feeble structure, with the proximal joint of the outer ramus narrow cylindrical in shape, and the distal joint produced to a rather slender claw. Outside this claw the small apical joint is attached, pointing straight downwards, and immediately in front of it a still smaller thin spinule occurs. The inner ramus is very slender and attenuated, extending to the end of the proximal joint of the outer ramus, and is tipped with 2 rather long setae diverging by their outer parts.

The *male* is rather inferior in size to the female and of more slender shape, with the cephalic segment less vaulted dorsally, and the lateral lobes of the last pedigerous segment almost obsolete. The tail is, moreover, as usual, much narrower, and composed of 5 segments not much different in length. The caudal rami do not exhibit any obvious asymmetry, and have all the marginal setae of uniform structure.

The right anterior antennae is transformed in the usual manner, and has the terminal section comparatively short, though apparently composed of 4 joints.

The last pair of legs (fig. 12) are largely developed, and exhibit a rather characteristic appearance, in particular as regards the right leg. This leg is almost twice as long as the left, and is generally strongly curved inwards. The distal segment of the basal part has a very unusual shape, forming inside a large, somewhat lamellar expansion, narrowly truncated at the end, and causing this segment to be almost twice as broad as it is long. The proximal joint of the outer ramus forms with this segment an extremely movable articulation, and gradually widens towards the end, which is armed inside with a strong deflexed spine. The distal joint is rather large and somewhat fusiform in shape, with the inner edge perfectly straight, the outer well curved and quite unarmed. The apical claw is rather strong and evenly curved throughout. The inner ramus of this leg is quite simple, though composed of 2 well-defined joints.

The left leg has no inner ramus, its place being only occupied by a slight angular projection. The terminal part is of inconsiderable size and produced at the end to a triangular lappet, to the outer side of which a peculiar digitiform appendage is attached accompanied by a thin bristle. Otherwise this part is quite unarmed.

Remarks.—This form was described and figured in the year 1899 by the present author from specimens forwarded to me by Dr. Purcell. It is a rather anomalous species, differing conspicuously from the typical members of the genus *Diaptomus*, both as to the outward appearance and to the structure of some of the appendages, so as perhaps more properly to be regarded as the type of a particular genus.

Occurrence.—The specimens originally examined by me were collected by Dr. Purcell at five different places near Cape Town. In some of the samples it occurred very abundantly. A few specimens were also found in samples more recently collected on the Cape Flats by Mr. Barnard. As above mentioned, I also succeeded in rearing some specimens of this form from dried mud kindly sent to me by Dr. Purcell.

5. Diaptomus rigidus, n. sp.

(Plate VIII, figs. 13–18.)

Distinctive Characters.—Length of female, 2·10 mm. Anterior division of body somewhat similar to that of *D. capensis*, tail, however, differing conspicuously in the shape of the genital segment, which is much more prolonged and perfectly symmetrical. Last pair

of legs in male likewise rather dissimilar. Right leg with the distal segment of the basal part only slightly expanded inside, proximal joint of outer ramus with only a slight rudiment of a spine, distal joint with a well-developed outer-edge spine near the end. Left leg with the terminal part much larger than in *D. capensis*, and armed on the posterior face, close to the base, with a strong deflexed spine, apical lappet obtusely rounded off.

Description of the Female.—The general shape of the body (see figs. 13 and 14) somewhat resembles that of the preceding species, though the anterior division appears less compressed and, seen dorsally, more contracted in front. The dorsal face of this division is also more flattened, giving to the animal a peculiar rigid appearance; hence the specific name proposed. The frontal part of the head exhibits, seen laterally (fig. 15), a much similar shape to that in *D. capensis*. The lateral lobes of the last segment are comparatively a little shorter than in that species and more extant, as also more distinctly asymmetrical, the left lobe being conspicuously larger than the right.

The tail is rather more prolonged than in the preceding species, and pronouncedly distinguished by the very different appearance of the genital segment, this segment being considerably prolonged, so as occupying fully half the length of the tail. It is, moreover, not at all, as in *D. capensis*, asymmetrical, but quite uniformly protuberant on each side at the base, its posterior part being regularly cylindrical in shape. The caudal rami (see fig. 18) exhibit quite a normal appearance, no asymmetry being detected. They are slightly divergent, and have the marginal setae moderately prolonged.

The ovisac (see fig. 13) is rather large and almost circular in outline.

The several appendages of the body agree so closely in their structure with those in the preceding species, that I do not find it necessary to describe them in detail.

I only give for comparison on the accompanying plate a figure of a leg of the last pair (fig. 16), showing it to be a little more robust than in *D. capensis* (fig. 11).

The *male* is of very small size, as compared with the female, being scarcely larger than the male of the preceding species. The sexual differences are the usual ones.

Yet the last pair of legs (fig. 17) merit to be described more closely, as they differ in some points rather conspicuously from those in *D. capensis*. The right leg is comparatively less prolonged, and has the 2nd segment of the basal part far less expanded, its inner edge being only somewhat angularly produced in the middle. The 1st

joint of the outer ramus is scarcely constricted at the base, and has only a slight rudiment of the spine found in *D. capensis* at the inner distal corner. The 2nd joint, too, is of a rather different shape, being of uniform width throughout, and is armed with a well-defined, though rather short, outer-edge spine near the end. The apical claw is strongly incurved and somewhat flexuous. The left leg has the terminal part comparatively much larger than in the preceding species, being almost twice as long as the basal one. It is armed on the posterior face near the base with a very strong deflexed spine, and has, moreover, about in the middle of the outer edge a small spinule, and farther below a minute nodiform prominence. The apical lappet is rounded off at the extremity and finely denticulate on the edge.

Remarks.—The above-described form is nearly allied to *D. capensis*, but of considerably larger size, and is, moreover, easily distinguished by the very different shape of the genital segment in the female. The structure of the last pair of legs in the male is also rather different, as shown by the description given above.

Occurrence.—Several specimens of this form, most of them of the female sex, were collected by Mr. J. H. Power from a vley at Kimberley.

6. Diaptomus purcelli, G. O. Sars.

(Plate IX, figs. 1–8.)

Diaptomus purcelli, G. O. Sars. Arch. f. Mathem. u. Naturv., vol. xxviii, No. 8, p. 12, pl. ii, figs. 3–10.

Distinctive Characters.—Length of female, 1·20 mm. Body moderately slender, with the frontal part of head only slightly vaulted dorsally. Lateral lobes of last pedigerous segment terminating each in a very sharp point. Genital segment conspicuously protuberant at the base on left side; last caudal segment with the anal opercle remarkably prominent. Ovisac cordiform. Anterior antennae considerably prolonged, with a remarkably strong seta at the end of the proximal joint. Last pair of legs with the terminal claw coarsely serrate inside, inner ramus extending to the end of the proximal joint of the outer. Right last leg of male with a peculiar twisted spiniform process inside the 1st joint of outer ramus, 2nd joint with a short outer-edge spine near the end. Left leg with the terminal part rather large and armed outside with a remarkably strong claw-like spine, inner edge angularly produced below, apical lappet straight and narrow linguiform.

Description of the Female.—The body (see figs. 1 and 2) is considerably more slender than in the two preceding species, with the anterior division narrow oblong in shape and rather contracted in front. The cephalic segment is about the length of the 3 succeeding segments combined, and has the frontal part only slightly vaulted dorsally, so as looking, seen laterally, much narrower than in the two preceding species. The rostral protuberance is very small, though tipped with the usual recurved tentacular appendages. The last segment is completely coalesced with the preceding one, and has the lateral lobes comparatively short, but each terminating in a very sharp point. The right lobe is somewhat broader than the left, and has inside the point a slight lamellar expansion.

The tail is about half the length of the anterior division, and is composed of 3 well-defined segments rather movably articulated together. The 1st or genital segment is of moderate size and somewhat asymmetrical, exhibiting near the base on the left side a rather prominent rounded protuberance, genital area terminating in a short recurved projection. The last segment is distinguished by the anal opercle being quite unusually prominent, so as giving to this segment, seen laterally, a peculiar clavate shape (see fig. 2). The caudal rami are comparatively small but of quite normal structure.

The ovisac (see fig. 1) is of a somewhat unusual appearance, being broadly cordiform in shape, with the posterior edge distinctly emarginated in the middle. The enclosed ova are comparatively large and few in number.

The anterior antennae (fig. 3) are much more prolonged than in the two preceding species, extending, when reflexed, somewhat beyond the middle caudal segment. They are, as usual, composed of 25 joints rather densely clothed with setae. One of these setae, issuing from the end of the proximal joint, is highly distinguished by its extraordinary development, equalling in length about $\frac{1}{3}$ of the antenna. It may, however, easily escape attention, as it in most cases lies in close approximation to the anterior edge, only projecting with its somewhat procurved extremity.

The posterior antennae and the oral pieces do not exhibit any noticeable particularities in their structure.

The natatory legs (fig. 4) also look rather similar to those in the two preceding species, though having the rami comparatively narrower and more produced.

The last pair of legs (fig. 5) are of moderate size, and in particular distinguished by the shape and armature of the terminal claw, which

is comparatively short, but rather broad, knife-shaped, and coarsely serrate at the inner sharpened edge. The inner ramus does not fully extend to the end of the proximal joint of the outer, and is tipped with 2 small spines.

The *male* (fig. 6) is not much inferior in size to the female, but is easily recognised by the usual sexual differences.

The caudal rami (see fig. 8), too, are distinctly asymmetrical, the right ramus being somewhat larger than the left, and having the outermost seta transformed to a coarse spine.

The last pair of legs (fig. 7), though built on the very same type as in the two preceding species, exhibit some well-marked differences in their details from either of them. The right leg has the 2nd basal segment only slightly expanded, with the inner edge evenly bowed and partly fringed with small denticles. The proximal joint of the outer ramus is armed at the end inside with a peculiar twisted spiniform process continued at the base in a short hyaline rim. The distal joint is narrow oblong in shape, and, as in *D. rigidus*, armed with a short outer-edge spine close to the end. The apical claw is well developed and gently curved. The inner ramus is quite simple uniarticulate. The left leg, as in the two preceding species, does not exhibit any trace of an inner ramus. The terminal part is rather large and of a somewhat irregular oblong shape, terminating in a well-defined narrow linguiform lappet, and having the inner edge produced below to a rather prominent angle. From the posterior face of this part, about in the middle, a very strong claw-like process originates, extending beyond the outer edge and curving downwards. This process seems to some extent to be movable, as several muscles are seen joining its base. Immediately below it a small outward-pointing prominence occurs tipped with fine cilia.

Remarks.—This form was originally described by the present author in the same paper in which *D. capensis* was dealt with, and the specific characters of these two species demonstrated. Although some points of agreement with the two preceding species may be found, the present form is prominently distinguished from either of them, both as to the outward appearance and to the structure of some of the appendages, in particular that of the last pair of legs in the two sexes. As quite unique characters of the species may be named the extraordinary development of one of the setae attached to the anterior antennae, and the peculiar shape of the ovisac. It is by far the smallest of the four species here recorded.

Occurrence.—Several specimens of this small Diaptomid were picked

up from samples taken by Dr. Purcell, some at Bergvliet, Cape Peninsula, some in the Cape Flats.

7. Diaptomus congruens, n. sp.

(Plate IX, figs. 9–13.)

Distinctive Characters.—Length of female, 1·90 mm. Body very slender, with the anterior division almost cylindrical in shape, frontal part of head slightly prominent anteriorly. Last pedigerous segment faintly defined from the preceding one; lateral lobes short and slightly extant, each terminating in a very sharp point. Genital segment much prolonged, subcylindrical in shape, with a small protuberance on each side of the base tipped with a short spike. The last 2 caudal segments very small and somewhat imperfectly defined. Anterior antennae much produced, exceeding in length the body. Last pair of legs rather clumsy, with the inner ramus very short. Right anterior antenna of *male* with the 2nd joint of the terminal section produced at the end to a strong spiniform projection. Right last leg with the distal joint of the outer ramus inflexed and armed outside, above the middle, with a very coarse spine. Left leg with the 2nd basal segment produced at the end inside to a conical process carrying the inner ramus, terminal part poorly developed, consisting of 2 digitiform lobules, the outer biarticulate, the inner uniarticulate.

Description of the Female.—The body (see figs. 9 and 10) is considerably more slender than in the three preceding species, with the anterior division narrow oblong or almost cylindrical in shape, though slightly contracted in front. The cephalic segment is about the length of the 3 succeeding segments combined, and is, seen dorsally, narrowly rounded at the extremity. Seen laterally (fig. 10), it appears gradually contracted, with the frontal part slightly projected. The rostral protuberance is short, and provided with the usual tentacular appendages. The last segment is dorsally confluent with the preceding segment, but the limit between them is well observed on each side. The lateral lobes of this segment are comparatively short, but somewhat extant, each terminating in a very sharp point. The left lobe is a little larger and more prominent than the right.

The tail scarcely exceeds in length $\frac{1}{3}$ of the anterior division, and is composed of 3 segments, the last 2 being, however, very small and less perfectly defined from each other. The genital segment is well developed, occupying rather more than half the length of the tail, and is of narrow cylindrical form, with a slight protuberance on each side

close to the base and tipped with a small spike. The ventral face of the segment exhibits in front a well-defined rounded genital protuberance, and appears also slightly expanded at the end. The 2nd caudal segment is extremely small and, as it were, sunk within the end of the genital segment, with which it has a very movable articulation. It is partly confluent with the last segment dorsally; but laterally the 2 segments appear pretty well defined from each other. The caudal rami are of quite normal structure, and about the length of the anal segment.

The ovisac is rather large and broadly rounded off at the extremity.

The anterior antennae (see figs. 9 and 10) are considerably prolonged, attaining the length of the whole body, and when reflexed even extending somewhat beyond the tips of the caudal rami. They are, as usual, composed of 25 joints somewhat sparingly clothed with setae, none of which are distinguished by any extraordinary length.

The posterior antennae, the oral pieces, and the natatory legs are of quite normal structure.

The last pair of legs (fig. 11), however, look somewhat unlike those in the preceding species, being of a rather clumsy appearance, with the proximal joint of the outer ramus much thickened, and the terminal claw comparatively short and stout. The inner ramus is, moreover, unusually poorly developed, not even extending to the middle of the proximal joint of the outer ramus.

The *male* is of rather smaller size than the female, and differs from it in the usual manner.

The right anterior antennae (fig. 12) have the middle section somewhat less tumified than in the three preceding species, and are, moreover, distinguished by the 2nd joint of the terminal section being produced at the end anteriorly to a strong spiniform process. The 2 outer joints of this section are rather small and of comparatively simple structure.

The last pair of legs (fig. 13) differ in some respects rather pronouncedly from those in the three preceding species, their structure agreeing on the whole with that found in the more typical species of the present genus. The right leg is rather powerfully developed, and has the 2nd basal segment gradually somewhat widening distally, carrying at the end inside the rather small and simple inner ramus. The proximal joint of the outer ramus is comparatively short, being slightly protuberant inside and produced at the end outside to an acute corner. The distal joint is rather large, obpyriform in shape, and conspicuously bent inwards, with the outer edge considerably

bowed and armed, somewhat above the middle, with a very coarse deflexed spine. The apical claw is well developed and somewhat unequally curved. The left leg is scarcely more than half as long as the right, and has the 2nd basal segment produced at the end inside to a conical deflexed process, to which a small digitiform appendage is attached, evidently representing the inner ramus. The terminal part of this leg is very much reduced, being replaced by 2 small digitiform lobules partly confluent at the base, the outer one the larger and biarticulate, the inner quite simple and uniarticulate.

Remarks.—This is a quite genuine member of the genus *Diaptomus*, agreeing rather closely with some of the well-known northern species, though apparently distinct from any of them. The specific name proposed alludes to this near relationship.

Occurrence.—Numerous specimens of this form were found in one of the samples taken by Mr. Barnard at Ongka, Ovamboland, South-West Africa. The preserved specimens were extremely pellucid and quite colourless.

Division CYCLOPOIDA.

Fam. CYCLOPIDAE.

Gen. CYCLOPS, O. F. Müller (sens. strict.).

8. Cyclops tenuisaccus, n. sp.

(Plate X, figs. 1–13.)

Distinctive Characters.—Length of female, 1·56 mm. Body moderately slender, with the anterior division somewhat tumefied in front. Last pedigerous segment slightly produced laterally. Genital segment rather dilated in front. Caudal rami considerably produced, occupying more than half the length of the tail, innermost apical seta about twice the length of the outermost, bristle of outer edge somewhat remote from the apex. Ovisacs unusually narrow and greatly divergent. Anterior antennae of moderate length, 17-articulate. Natatory legs with 2 outer-edge spines on the terminal joint of the outer ramus in all the pairs ; apical spines on inner ramus of 4th pair rather unequal. Last pair of legs with the distal joint slightly longer than the proximal, apical seta much shorter than the lateral.

Description of the Female.—The body (see fig. 1) is moderately slender, and of the usual, somewhat pyriform shape, the anterior division being rather tumefied, with the greatest width somewhat in

front of the middle and slightly exceeding half the length. The head, as in all known *Cyclopoida*, is completely confluent with the 1st pedigerous segment, both together constituting the large anterior body-segment, to which generally the name cephalic segment is applied. It occupies rather more than the half of the anterior division, and is evenly rounded off in front, being, however, continued ventrally in an obtuse recurved rostral protuberance. The 3 succeeding free segments diminish gradually in size, and have the lateral parts closely crowded and rounded off at the posterior corner. The last segment is still smaller, and, as usual, is sharply defined from the preceding segment, with which it has a very movable articulation, whereas behind it is firmly connected to the genital segment, so as looking to form more properly part of the tail. It is about twice as broad as it is long, and has the lateral parts slightly expanded.

The tail somewhat exceeds half the length of the anterior division, and is composed of 4 well-defined segments in addition to the caudal rami. The 1st of these segments, the genital one, is rather large and conspicuously dilated at the base. The seminal receptacle, as far as I could make it out in the preserved specimens, is quite simple, without the large posterior expansion characteristic of the succeeding genus. The remaining caudal segments successively diminish in size, and combined they scarcely exceed the genital segment in length.

The caudal rami (fig. 13) are considerably produced, occupying rather more than half the length of the tail, and fully five times as long as they are broad. They are narrow linear in shape, and scarcely at all divergent, with the inner edge finely ciliated, the outer provided, at some distance from the end, with a short bristle. To the obtusely truncated end of each ramus 4 setae of very unequal length are attached, the 2 middle ones being considerably produced and distinctly jointed at the base, the inner of them about the length of the whole tail. Of the 2 remaining setae, that attached to the inner corner is about twice as long as that on the outer. In addition to the above-mentioned setae, as in most other *Cyclopoida*, a very small bristle is seen issuing dorsally close to the tip of each ramus.

The ovisacs (see fig. 1) are greatly divergent, and distinguished by their extremely narrow shape, this particularity having indeed given rise to the specific name proposed.

The eye is only faintly traced within the frontal part of the head, its pigment being, as usual, almost wholly destroyed by the action of the preserving fluid.

The anterior antennae (fig. 2) are of moderate length, extending,

when reflexed, not fully to the end of the 1st free pedigerous segment, and gradually taper towards the end. They are, as in most other species of this genus, composed of 17 joints, clothed with rather strong and somewhat unequal setae pointing in different directions. The joints are of rather unequal size, the 1st being by far the largest of all, the 4th and 7th also conspicuously larger than the next preceding and succeeding ones. The 7th joint is followed by a row of 8 remarkably short and uniform joints arranged in 2 successive, though not very sharply defined, sets, with 4 joints in each set. The 2 outermost joints are again considerably prolonged, and in the present species of uniform size, both provided with a well-marked longitudinal keel.

The posterior antennae (fig. 3) are of comparatively feeble structure, each forming a rather narrow stem curving behind and composed of 4 joints. The first 2 of these joints may together represent the basal part, the other 2 the inner ramus, the outer ramus being replaced by a single very large and prolonged seta attached to the hind distal corner of the 1st basal joint and pointing straight behind. The 2nd basal joint is scarcely more than half as large as the 1st, and has only a single small bristle on the anterior edge, whereas 2 such bristles are present on the 1st joint. The penultimate joint is conspicuously contracted at the base, and gradually widens somewhat distally, being fringed along the anterior edge with a row of about 8 procurved bristles successively increasing in length distally. The terminal joint is of narrow linear shape and rather longer than the penultimate one, carrying at the tip 4–5 strong anteriorly curving setae.

The anterior lip (fig. 4) terminates behind in a sharpened edge, defined on each side by a somewhat projecting corner and fringed in the middle with densely crowded minute denticles.

The mandibles (fig. 5) have the masticatory part rather narrowly produced and only slightly expanded at the end, though well armed in the usual manner. The palp is reduced to an insignificant nodule, which, however, is tipped by 2 rather long and finely plumose setae accompanied by a rudimentary bristle.

The maxillae (fig. 6) are of comparatively simple structure, exhibiting a rather massive basal part filled with strong muscles, but without any trace of a vibratory (epipodal) lamina. It is continued in a somewhat compressed triangular masticatory lobe, curving inwards and armed with several short spines, 3 of which originate close together from the tip. The palp has the form of a thin lamella attached outside the basal part, and armed at the narrowly truncated extremity

with a short spine accompanied by 2 likewise short setae. Moreover, at some distance from the base, 3 somewhat diverging finely ciliated setae are attached to a slight expansion of the outer edge, and immediately above this expansion another somewhat similar seta issues.

The anterior maxillipeds (fig. 7) are rather more fully developed, with the basal part composed of 2 comparatively large and somewhat flattened segments, the 1st of which is provided near the end with a small bisetose lamella. The 2nd segment is somewhat larger, and provided with a single seta issuing from the middle of the somewhat projecting anterior edge. Between the basal and terminal parts a narrow lobe is seen projecting anteriorly tipped with 2 unequal setae. The terminal part is very movably articulated with the basal one, and, as the latter, composed of 2 joints ; but these joints are of a very dissimilar appearance, the 1st being considerably produced at the end and terminating in a strong claw-like process, at the base of which is attached a coarse seta extending alongside the claw, both together forming thus a kind of scissors. The last joint is very small and tipped with 2 curved spines, accompanied by 2 or 3 thin bristles.

The posterior maxillipeds (fig. 8) are much smaller than the anterior, though composed of the same chief parts. The 2 segments of the basal part are far less expanded, and each provided with 2 unequal setae. The terminal part has its 2 joints quite simple, each armed with a slender anteriorly curving spine, the last joint, moreover, with 2 small setae.

The natatory legs (figs. 9–11) are built on the usual Cyclopoid type, being comparatively short and stout, with the basal part broad and somewhat lemellar, and both rami distinctly triarticulate, the inner one slightly longer than the outer, the terminal joint of which has only 2 outer-edge spines.

The 1st pair of legs (fig. 9) are somewhat smaller than the succeeding ones, and are distinguished by the presence of a slender spine attached to the inner distal corner of the basal part. Moreover, the terminal joint of the outer ramus is much shorter than in the other pairs, and wants the strong apical spine, this spine being replaced by an ordinary seta.

The 4th pair of legs (fig. 11) are comparatively more slender than the preceding ones, with the inner ramus narrower and more produced, and only provided with 2 setae of the inner edge. On the tip this ramus is armed with 2 spines of somewhat unequal length, the inner one being scarcely more than half as long as the outer.

The last pair of legs (fig. 12), as in other *Cyclopoida*, are extremely

small and of very simple structure, each leg being only composed of 2 joints, the proximal one carrying outside a slender bristle attached to a slight expansion of the joint, the distal one rather narrower and provided with 2 strong setae of unequal length, the shorter one attached to the tip, the longer one to a well-marked ledge of the inner edge close to the apex.

The *male* is of much smaller size than the female, and easily recognisable by the usual sexual differences in the structure of the tail and of the anterior antennae.

Remarks.—This is the largest of the South African *Cyclopidae* as yet examined by me. Although the structure of the several appendages agrees rather closely with that in the succeeding genus, I think that it cannot be adduced to that genus, but that it more properly may be referred to the genus *Cyclops*, in the restriction now generally accepted, in particular on account of the simple structure of the seminal receptacle and the greatly produced caudal rami.

Occurrence.—Some specimens, most of them of the female sex, were found in a sample taken by Dr. Purcell at Salt River, in the neighbourhood of Cape Town.

Gen. MESOCYCLOPS, G. O. Sars.

9. Mesocyclops obsoletus (Koch).

(Plate X, figs. 14–18.)

Cyclops obsoletus, Koch. Deutschlands Crustaceen, etc., Heft 21, pl. v.

Syn. : Cyclops leuckarti, Claus.

Distinctive Characters.—Length of female amounting to 1·10 mm. Cephalic segment conspicuously dilated anteriorly, with the front narrowly rounded. Last pedigerous segment very small. Genital segment only slightly dilated in front ; seminal receptacle produced behind to a linguiform lappet. Caudal rami about twice as long as broad, innermost apical seta fully three times as long as the outermost, bristle of outer edge rather remote from the apex. Ovisacs narrow oblong and rather divergent. Anterior antennae considerably produced and densely setiferous. Fourth pair of legs with the apical spines of inner ramus only slightly unequal. Last pair of legs with the proximal joint very short, setae of distal joint much produced, and of equal length.

Remarks.—This widely distributed species has generally been

recorded under the name of *Cyclops leuckarti*, Claus, but its identity with *C. obsoletus*, Koch, was stated by the present author in the year 1914, and as the specific name proposed by Koch is of much earlier date than that given to the species by Claus, it must of course be retained for this form. The species is easily recognisable by the shape of the anterior division of the body, the comparatively long and densely setiferous anterior antennae, as also by the narrow and divergent ovisacs. For comparison with the three other species here recorded, I give on the accompanying plate a figure of an ovigerous female together with some details. Any detailed description of this well-known form I do not think is requisite.

Occurrence.—Some few female specimens, exactly agreeing with the northern form, though of slightly larger size, were found in a sample taken by Dr. Purcell from a pond in the Cape Flats.

10. Mesocyclops neglectus, G. O. Sars.

(Plate X, figs. 19–22.)

Mesocyclops neglectus, G. O. Sars. Proceed. Zool. Soc. London, 1909, p. 51, pl. xiv, figs. 113–117.

Syn. : Cyclops hyalinus, Richard (not Rehberg).

Syn. : Cyclops oithonoides, Mrazek (not G. O. Sars).

Distinctive Characters.—Length of female, 0·80 mm. Body comparatively short, with the anterior division somewhat tumefied, but regularly oval in outline. Genital segment as in *M. obsoletus*. Caudal rami, however, much shorter, with the innermost apical seta scarcely more than twice as long as the outermost, and the bristle of outer edge not far remote from the apex. Ovisacs somewhat appressed to the tail. Anterior antennae comparatively less prolonged. Fourth pair of legs with the inner ramus narrowly produced, outer apical spine very small. Last pair of legs with the distal joint somewhat clavate in shape, its 2 setae very unequal in length.

Description of the Female.—The general shape of the body (see fig. 19), as compared with that in the preceding species, appears on the whole rather shorter and stouter, with the anterior division considerably tumefied and, seen dorsally, rather regularly oval in outline, the greatest width occurring about in the middle. The frontal part of the cephalic segment is also more obtusely blunted than in *M. obsoletus*. The last pedigerous segment is still smaller than in that species, with the lateral parts scarcely at all expanded.

The tail scarcely exceeds half the length of the anterior division,

and has the genital segment very narrow, though rather similar in structure to that in the preceding species, with the seminal receptacle of the same characteristic shape. The caudal rami (fig. 20) are, however, comparatively shorter and stouter, with the outer-edge bristle attached much nearer to the tip. The mutual relation of the apical setae is also somewhat different, the innermost one being scarcely more than twice as long as the outermost.

The ovisacs (see fig. 19) are comparatively small and somewhat appressed to the sides of the tail.

The anterior antennae are scarcely as long as in *M. obsoletus*, but of a very similar structure, being, as in all the other species of this genus, composed of 17 joints.

The natatory legs are on the whole less robust than in the preceding species, and in particular is the 4th pair distinguished by the slender form of the rami, the terminal joint of the inner one being quite unusually narrowed, with the outer apical spine much reduced in size.

The last pair of legs (fig. 21) are comparatively shorter and stouter than in *M. obsoletus*, and the setae of the distal, somewhat claviform joint are very unequal in length.

Remarks.—This species was described by the present author in the year 1909 from specimens obtained in the great Central African lakes. It is closely allied to *M. crassus*, Fischer (*hyalinus*, Rehberg), with which it indeed has formerly been confounded, but differs in the less robust shape of the body, and more particularly in the rather dissimilar mutual relation of the caudal setae.

Occurrence.—Some few female specimens of this form were picked up from a sample taken by Dr. Purcell from a brick-pond at Bergvliet, Cape Peninsula, May 1896.

11. Mesocyclops oblongatus, n. sp.

(Plate XI, figs. 1–15.)

Distinctive Characters.—Length of female, 0·90 mm. Body more slender than in the other species, with the anterior division oblong oval in shape. Last pedigerous segment slightly produced laterally. Genital segment somewhat dilated in front. Caudal rami more produced than in *M. obsoletus*, innermost apical seta about three times as long as the outermost, bristle of outer edge not far remote from the apex. Ovisacs oval and closely appressed to the tail. Natatory legs resembling in structure those in *M. neglectus*. Last pair of legs with

the setae of the distal joint very unequal. Anterior antennae of male rather slender, but transformed in the usual manner.

Description of the Female.—The body (see figs. 1, 2) is comparatively more slender than in any of the other known species of the present genus, the anterior division being, seen dorsally, regularly oblong oval in shape, with the greatest width in the middle and about equal to half the length. Seen laterally (fig. 2), this division appears also far less vaulted dorsally than in the two preceding species. The cephalic segment is rather large and quite evenly rounded off in front. The last segment is, as usual, rather small, but fully twice as broad as long.

The tail considerably exceeds in length half the anterior division, and gradually tapers behind. The genital segment is conspicuously dilated in front, and has the seminal receptacle produced behind as in the other species (see fig. 4). The caudal rami (see fig. 5) are considerably more produced than in the two preceding species, attaining the length of the last 2 segments combined, and fully three times as long as they are broad. The bristle of the outer edge is very small, and not far remote from the apex. The mutual relation of the apical setae is about as in *M. obsoletus*.

The ovisacs (see fig. 1) are very unlike those in the said species, both as to shape and to attitude. They are of rounded oval form, and are always found closely appressed to the sides of the tail.

The anterior antennae (fig. 6) are comparatively less produced than in the two preceding species, extending, when reflexed, scarcely beyond the limits of the 1st free pedigerous segment, being, however, otherwise of quite normal structure.

The same may also be said of the posterior antennae and the oral pieces (figs. 7–9), and a detailed description of these appendages I do not therefore regard as requisite.

The natatory legs (figs. 10–12) also are built on the very same type as in the other species, and in particular is the similarity of the 4th pair (fig. 12) with that in *M. neglectus* rather perplexing.

The last pair of legs (fig. 13) agree with those in the said species in the great inequality of the 2 setae on the distal joint, the apical one being scarcely half as long as the lateral.

The *male* (fig. 14) is of somewhat smaller size than the female, and has the body rather more slender, with the anterior division conspicuously narrower and more blunted in front.

The tail is considerably more produced and, as usual, composed of 5 well-defined segments, the 1st of which is much the largest, and generally contains on each side an oval, dark-coloured spermatophore.

The anterior antennae are considerably more prolonged than in the female, and are, as usual, both transformed to powerful grasping organs, being in preserved specimens generally abruptly bent forwards (see fig. 14). Their closer structure is shown by fig. 15.

The last pair of legs, on the other hand, do not exhibit any obvious difference in their appearance from those in the female.

Remarks.—The above-described form, though rather nearly related to the two preceding ones, is unquestionably specifically distinct from either of them, being easily recognised by the rather different shape of the body, as also by the attitude of the ovisacs. In the structure of the several appendages it seems to come nearer to *M. neglectus* than to *M. obsoletus*.

Occurrence.—Numerous specimens of this form occurred in a sample taken by Dr. Purcell, April 1896, from a small duck-pond at Salt River, in the neighbourhood of Cape Town. It also occurred occasionally in gatherings taken on the Cape Flats.

12. Mesocyclops major, n. sp.

(Plate XI, figs. 16–20.)

Distinctive Characters.—Length of female, 1·52 mm. Body robust, with the anterior division much tumefied. Last pedigerous segment slightly expanded laterally. Genital segment conspicuously dilated in front. Caudal rami more produced than in *M. obsoletus*, mutual relation of the setae about as in that species. Anterior antennae comparatively less produced. Natatory legs with the rami broader; apical spines on inner ramus of 4th pair nearly equal. Last pair of legs with the distal joint tapered and the setae somewhat unequal.

Description of the Female.—The general shape of the body (see fig. 16) appears rather robust, the anterior division being considerably tumefied, with the greatest width somewhat in front of the middle. The last segment is slightly expanded laterally, and more than twice as broad as long.

The tail about equals half the length of the anterior division and gradually tapers distally. The genital segment is conspicuously dilated in front, its greatest width fully equalling the length. The seminal receptacle appears to be somewhat shorter than in the three preceding species, but otherwise of a very similar structure. The caudal rami (fig. 20) are rather produced, being more than three times as long as broad, and fully attaining the length of the 2 preceding segments combined. The mutual relation of the apical setae is nearly

as in *M. obsoletus*; but the outer-edge bristle occupies a somewhat different place, being attached at about the posterior third part of the ramus, whereas in *M. obsoletus* it occurs almost in the middle.

The ovisacs were not present in any of the specimens examined by me.

The anterior antennae (see fig. 16) are rather produced, though scarcely so much as in *M. obsoletus*, nor is their setous clothing so dense as in that species.

The natatory legs (figs. 17 and 18) are comparatively more strongly built than in any of the preceding species, with the rami considerably broader. Those of the 4th pair (fig. 18) are, however, as usual, somewhat more slender than the others, with the inner ramus more produced. The 2 apical spines on this ramus are only slightly unequal.

The last pair of legs (fig. 19) are in particular distinguished by the shape of the distal joint, which is conspicuously contracted towards the tip. Its 2 setae are rather unequal in length.

Remarks.—The present form bears a rather close resemblance to *M. obsoletus*, so as perhaps, on a superficial examination, easily to be adduced to that species. It is, however, of much larger size, and, as it also exhibits some slight differences in the structural details, its specific distinctness appears to me to be indubitable.

Occurrence.—Only a few female specimens of this form have as yet come under my notice. They were found in a sample taken by Dr. Purcell from a brick-pond at Bergvliet, Cape Peninsula, May 1896.

Gen. LEPTOCYCLOPS, G. O. Sars.

13. Leptocyclops sublaevis, n. sp.

(Plate XII, figs. 1–10.)

Distinctive Characters.—Length of female, 1·20 mm. Body very slender, with the anterior division only slightly vaulted dorsally. Last pedigerous segment narrowly produced laterally. Genital segment rather broad at the base, seminal receptacle simple. Caudal rami considerably produced, without any distinct serration of the outer edge, innermost apical seta only slightly longer than the outermost. Ovisacs somewhat divergent. Anterior antennae moderately slender, 12-articulate, outer joints rather elongated. Posterior antennae with the terminal joint shorter than the preceding one. The 3 anterior pairs of legs with 3 outer-edge spines on the terminal joint of outer ramus. Fourth pair with only 2 such spines, inner

ramus longer than outer, and the apical spines normally developed. Last pair of legs with the spine of inner edge exceedingly strong.

Description of the Female.—The body (see fig. 1) is very slender, with the anterior division only slightly dilated, and, seen dorsally, oblong oval in shape, with the greatest width somewhat in front of the middle, and scarcely attaining half the length. The lateral corners of the segments are somewhat projecting behind, in particular those of the penultimate segment. The last pedigerous segment is short and broad, with the lateral parts produced to narrow, somewhat recurved lappets tipped with fine hairs.

The tail is very slender and attenuated, equalling about in length $\frac{2}{3}$ of the anterior division. The genital segment does not exceed in length the 2 succeeding segments combined, but is rather dilated at the base, its width here somewhat exceeding the length. The seminal receptacle is of quite simple structure. The caudal rami (see fig. 10) are very narrow and prolonged, attaining nearly the length of the 3 preceding segments combined. They are only very slightly divergent, and have the outer edge in most cases perfectly smooth, without the small denticles flanking this edge in most other species of the present genus. Only in a single case a slight indication of such denticles was observed immediately in front of the outer-edge bristle. This bristle is very small, and attached at a short distance from the tip of the ramus. The 2 middle apical setae are rather produced, though somewhat unequal in length, the inner one being, as usual, much the longer. The innermost seta is rather small, only slightly exceeding in length the outermost, which, however, is much coarser, almost spiniform.

The ovisacs (see fig. 1) are of oblong or somewhat fusiform shape, and rather divergent. As in all other known species of the present genus, their outer coating is very sharply marked and everywhere quite even.

The anterior antennae (fig. 2) are rather slender and attenuated, extending, when reflexed, about to the end of the 2nd free pedigerous segment. They are, as in the other species of this genus, only composed of 12 joints, this reduction being apparently due to a concrescence of some of the short joints following the 7th one in the 17-articulate antennae of the 2 preceding genera. In the present species the 3 last joints are remarkably narrow and prolonged.

The posterior antennae (fig. 3) are scarcely half as long as the anterior, and have the terminal joint unusually short, scarcely attaining the length of the preceding joint.

The oral pieces do not exhibit any more noticeable particularity in their structure.

The 3 anterior pairs of legs (figs. 4 and 5) differ, however, essentially from those in the preceding genus in the armature of the terminal joint of the outer ramus, this joint having 3, instead of 2, spines on the outer edge. In the 1st pair (fig. 4) these spines are rather thin, but in the 2 succeeding pairs (fig. 5) they are well developed and, like the strong apical spine, distinctly denticulate. The 4th pair of legs (fig. 6) are more in accordance with those in *Mesocyclops*, having only 2 outer-edge spines on the terminal joint of the outer ramus. In the present species these legs are rather strongly built, with the inner ramus distinctly projecting beyond the outer, and having the 2 apical spines well developed, though of somewhat unequal length.

The last pair of legs (fig. 7) are very unlike those in the 2 preceding genera, each leg being only composed of a single short and somewhat flattened joint, which terminates in a conical lappet tipped by a thin bristle. A similar, but rather shorter, bristle issues from a knob-like prominence outside the joint, and opposite this bristle a very strong spine is attached to the inner edge, curving downwards and coarsely denticulated throughout.

The *male* (fig. 8) is much smaller than the female, and of a quite particularly slender form of the body, the anterior division being only very slightly dilated and the tail extremely narrow and prolonged.

The anterior antennae (fig. 9) are transformed in the usual manner, but appear comparatively shorter and stouter than in the species of the preceding genus.

Remarks.—This is a quite genuine member of the present genus, though apparently lacking on the caudal rami the usual serration of the outer edge. In so far it somewhat resembles the European species *L. speratus* (Lilljeb.), from which it, however, in some other respects differs decidedly.

Occurrence.—Several specimens of this form were found in samples taken by Dr. Purcell from ponds in the Cape Flats. Most of the preserved specimens showed a well-marked light corneous colour of the body.

14. Leptocyclops prasinus (Fischer).

(Plate XII, figs. 11–20.)

Cyclops prasinus, Fischer. Beitr. zur Kennt. der Entomostraceen, p. 652, pl. xx, figs. 19–26.

Syn.: Cyclops pentagonus, Vosseler.

Distinctive Characters.—Length of female, 0·70 mm. Body comparatively short, with the anterior division rather tumefied. Last pedigerous segment very small. Genital segment only slightly dilated in front, but rather protuberant below, seminal receptacle of complicate structure. Caudal rami very short, with the innermost apical seta rudimentary. Ovisacs appressed to the tail. Anterior antennae not much produced, 12-articulate. Posterior antennae with the terminal joint rather prolonged. The 2 anterior pairs of legs with 3 outer-edge spines on the terminal joint of outer ramus, the 2 succeeding pairs with only 2 such spines; 4th pair rather feeble, with both rami narrow attenuated and of about equal length, apical spines of the inner one thin and very unequal. Last pair of legs with the spine of inner edge narrow, almost setiform.

Description of the Female.—The body (see figs. 11, 12) is on the whole of a much shorter and stouter appearance than in the preceding species, with the anterior division somewhat tumefied and, seen dorsally, rather regularly oval in shape. Seen laterally (fig. 12), the dorsal face of this division appears considerably vaulted throughout. The lateral corners of the segments are obtusely rounded off and not at all projecting. The last segment is very small, with the lateral parts not expanded.

The tail does not attain half the length of the anterior division, and has the genital segment only slightly dilated in front, but rather protuberant below (see fig. 12). The seminal receptacle I have not been enabled to trace distinctly in the preserved specimens, but, according to the statement of Dr. Schmeil, it is of a rather complicate structure. The caudal rami (fig. 20) are very short, being not nearly twice as long as broad, and scarcely exceeding the anal segment in length. Their outer edge does not exhibit any traces of denticles, but has the usual short bristle at some distance from the tip. The innermost apical seta is very small, scarcely attaining half the length of the outermost.

The ovisacs (see fig. 11) are of a similar shape to that in the preceding species, but are far less divergent, being generally rather closely appressed to the sides of the tail. The enclosed ova are few in number and appear somewhat angular by mutual pressure, only 2 rows being visible in the dorsal aspect of the animal.

The anterior antennae (fig. 13) are comparatively somewhat shorter and thinner than in the preceding species, but, as in that species, composed of 12 joints, the mutual relation of which, however, is a little different, the outermost joints being far less prolonged.

The posterior antennae (fig. 14), on the other hand, are considerably

more slender than in the said species, with the terminal joint much produced, far exceeding the preceding joint in length.

The 2 anterior pairs of legs (figs. 15 and 16) agree on the whole in structure with those in the preceding species, having 3 outer-edge spines on the terminal joint of the outer ramus. In the 2 succeeding pairs (figs. 17 and 18), however, only 2 such spines are present. The 4th pair of legs (fig. 18) are, moreover, rather feebly developed, both rami being remarkably narrow and attenuated and of uniform size. The apical spines on the inner ramus are very thin and exceedingly unequal in length, and also the spines of the outer ramus appear more feebly developed than usual.

The last pair of legs (fig. 19) are extremely small, but agree on the whole in structure with those in the preceding species, except that the spine of the inner edge is far less strong, being almost setiform in appearance.

Remarks.—This is a rather anomalous species, and indeed at first I felt some doubt about its real systematic position. After a careful anatomical examination I have, however, arrived at the conclusion that it ought to be included in the genus *Leptocyclops*, in spite of some rather puzzling divergences from the usual type.

Occurrence.—Some few female specimens of this small Cyclopid were picked up from samples taken by Dr. Purcell, partly from a dam at Bergvliet, Cape Peninsula, partly from ponds on the Cape Flats. The species seems to be widely distributed, being recorded from many distant parts of the continents.

AFROCYCLOPS, n. g.

Remarks.—This new genus is proposed to include the species originally described by Brady under the name of *Cyclops gibsoni*. Although this form in several respects bears a close resemblance to the typical species of the genus *Leptocyclops*, I have, on a closer examination, found that it in reality exhibits in the structural details some points of divergence sufficiently important to remove it from that genus. The chief differences refer to the structure of the legs and to the mutual relation of the 2 sexes.

15. Afrocyclops gibsoni (Brady).

(Plate XIII.)

Cyclops gibsoni, Brady. Proc. Zool. Soc. London, 1904, vol. ii, p. 123, pl. 6, figs. 1–10.

Syn. : Cyclops longistylis, Brady.

Description of the Female.—The length of fully adult specimens amounts to 1·20 mm., and this form is accordingly of middle size.

In shape the body appears rather robust, with the anterior division, seen dorsally (fig. 1), oblong oval in outline, its greatest width occurring about in the middle and equal to half the length. Seen laterally (fig. 2), the cephalic segment appears remarkably deep and gently vaulted dorsally, whereas the remaining part of the anterior division is somewhat depressed, with the lateral lobes of the segments slightly expanded. The last segment is rather broad and somewhat flattened, with the lateral parts distinctly lamellar, and clothed at the tip with a number of fine hair-like bristles.

The tail is comparatively less attenuated than in the *Cyclopidae* described in the preceding pages, and in particular, seen laterally, exhibits a rather clumsy appearance (see fig. 2). The genital segment is rather large, being fully as long as the 3 succeeding segments combined, and tapers only slightly behind. The seminal receptacle is comparatively of simple structure and inconsiderable size. The caudal rami are considerably produced, attaining nearly the length of the 3 preceding segments combined, and are narrow linear in shape. They are slightly divergent, and have the edges perfectly smooth. The 2 middle apical setae are well developed and of the usual appearance, whereas the other 2 setae are very small and subequal in length, that attached to the inner corner being, however, much thinner than that on the outer. The outer-edge bristle is extremely minute and attached near the tip of the ramus.

The ovisacs (see fig. 1) are comparatively small and oval in shape, being only slightly divergent.

The anterior antennae (fig. 3) are built on the very same type as in the genus *Leptocyclops*, being only composed of 12 joints. They are, however, comparatively less produced, extending, when reflexed, scarcely beyond the limits of the cephalic segment. Of the joints, the last is distinctly longer than the next preceding ones.

The posterior antennae (fig. 4) are comparatively short and stout, with the terminal joint of about same length as the penultimate one.

The mandibles (fig. 5) and maxillae (fig. 6) are of quite normal structure.

The 2 pairs of maxillipeds (figs. 7 and 8) are, however, comparatively shorter and stouter than in the preceding Cyclopids, the anterior ones (fig. 7) being in particular distinguished by the shortness of the

unguiform process issuing from the proximal joint of the terminal part.

The natatory legs (figs. 9–12) are very powerfully developed, and differ very essentially from those in *Leptocyclops* by the terminal joint of the outer ramus being in all the pairs only armed with 2 spines of the outer edge.

The 1st pair of legs (fig. 9) are, as usual, somewhat smaller than the succeeding ones, and have the inner ramus conspicuously broader than the outer, but scarcely longer. These legs, moreover, differ from the others in the presence of a well-marked spine at the inner distal corner of the basal part, and in the apical spine of the outer ramus being replaced by an ordinary seta.

The 2 succeeding pairs of legs (figs. 10 and 11) are of quite uniform structure, with both rami very strong and of about equal size. The spines of the outer ramus are very coarse, and successively increase somewhat in length distally, all being distinctly denticulated on the edges.

The 4th pair of legs (fig. 12) have, as usual, the rami somewhat narrower and more unequal, the inner one projecting distinctly beyond the outer. The terminal joint of this ramus has, moreover, only 2 setae inside, but is armed on the tip with 2 coarse spines of unequal length, flanked on each side by a dentiform projection of the joint.

The last pair of legs (fig. 13), as in the preceding genus, are uniarticulate, but the joint differs somewhat in shape, being comparatively longer and narrower, with the base conspicuously contracted. The spine of the inner edge is rather strong and coarsely denticulated on the outer edge, being slightly curved inwards, not, as in *Leptocyclops*, outwards.

The *male* (fig. 15), unlike what is generally the case, is of about same size as the female, and exhibits a similar robust shape of the body, the anterior division being scarcely narrower, though differing somewhat in the more extant lateral corners of the segments. The last pedigerous segment has the lateral lobes more evenly rounded off than in the female, and fringed throughout with a regular row of densely crowded short bristles (see fig. 18).

The tail (*ibid.*) appears somewhat more attenuated than in the female, and is, as usual, composed of 5 well-defined segments, the 1st of which is rather large and considerably dilated in front, exhibiting very distinctly the 2 chambers for lodging the spermatophores. The spine attached to the end of this segment on each side is much

prolonged, extending almost as far as the 3rd segment, and is coarsely denticulate. The caudal rami are exactly of same appearance as in the female.

The anterior antennae (fig. 16) are very powerfully developed, and in the preserved specimens are generally bent forwards, being curved in a hamiform manner (see fig. 15). They exhibit the 3 usual successive sections well defined from each other. The proximal section is nearly of equal width throughout, and has the number of joints rather reduced, some of them being only faintly indicated. Three of the setae attached to this section are exceedingly strong and produced, pointing in different directions. The middle section is considerably tumefied in its proximal part, and is traversed by a very strong muscle acting upon the terminal section. It is divided into 4 joints, the 2 middle ones shorter than the other 2, and is armed with a few spines of different size. The terminal section is much narrower and somewhat shorter than the middle one, with which it is very movably articulated. It is only composed of 2 joints, the proximal one somewhat curved and highly chitinised, the distal one of about same length but rather narrower, and terminating in a somewhat claw-shaped point.

The natatory legs are still more powerfully built than in the female, and in particular are the 2 middle pairs (fig. 17) in this respect highly distinguished. The proximal spine on the outer ramus is about as in the female, but the 4 other spines on this ramus, as also the apical spine on the inner ramus, exhibit a rather different appearance, being quite extraordinarily strong, dagger-like, with the edges perfectly smooth. The last pair of legs (see fig. 18) are exactly of same structure as in the female.

Remarks.—This form was originally described by Brady in the year 1904 from specimens collected at Greytown, Natal, and the same species was subsequently (1912) also recorded from Steinkopf, Bushmanland, and Berseba, South-West Africa, by C. van Douwe, who gives some additional notes on it, accompanied by a few figures. One of these figures, representing an ovigerous female, is, however, quite misleading, having apparently been drawn from a specimen deformed by action of the preserving fluid, all the segments being drawn out from each other in quite an unnatural manner, so as to give to the body a very narrow and elongated shape. Yet the other 3 detail-figures do not leave any doubt on the identity observed by him with Brady's species. In a more recent paper Brady has reproduced a number of drawings, made by Dr. Graham, of diverse

Cyclopids from living specimens, and has tried to identify these forms. One of them, to which the specific name *longistylis*, n. sp. has been given, looks so very like the form here treated of, that I cannot but believe it to be the very same species.

Occurrence.—A rather considerable number of specimens of this Cyclopid have been secured. They were found in several samples taken by Dr. Purcell from ponds in the neighbourhood of Cape Town. Unlike what is generally the case, male specimens were much more frequent than females.

Gen. PLATYCYCLOPS, G. O. Sars.

16. Platycyclops phaleratus (Koch).

(Plate XIV, figs. 1–4.)

Cyclops phaleratus, Koch. Deutschlands Crustaceen, etc., Heft 21, pl. ix.

Syn. : Cyclops canthocarpoides, Fischer.

Distinctive Characters.—Length of female, 0·80 mm. Body robust, with the anterior division rather broad and expanded. Last pedigerous segment almost three times as broad as long. Tail strongly built, with the segments partly spinulose. Genital segment short and broad. Caudal rami scarcely twice as long as broad, each with 3 oblique rows of small spinules across the dorsal face, outermost apical seta spiniform and about the length of the innermost, the 2 middle setae rather produced and distinctly spinulose. Ovisacs closely appressed to the tail. Anterior antennae comparatively feeble, 10-articulate, posterior ones, however, very strongly built. Last pair of legs imperfectly developed, each replaced by a slight rim armed with 3 sub-equal spiniform setae.

Remarks.—The present form is so well known and of such a characteristic appearance, that I think I may dispense with giving any detailed description of it. Yet, for comparison with the succeeding species, the above short diagnosis is given, and, on the accompanying plate, a figure of an ovigerous female together with a few detail-figures.

Occurrence.—Only some few female specimens of this easily recognisable form have been found in the material forwarded to me from the South African Museum. They were picked up from some samples taken by Dr. Purcell on the Cape Flats. The species has a very wide geographical distribution, being recorded from all of the five chief continents.

17. Platycyclops poppei (Rehberg).

(Plate XIV, figs. 5–17.)

Cyclops poppei, Rehberg. Beitr. z. Kenntn. d. freilebenden Susswasser Copepoden, Abh. d. nat. Verein zu Brehmen, p. 550, pl. vi, figs. 9–11.

Distinctive Characters.—Length of female, 0·76 mm. Body less robust than in the preceding species, with the anterior division comparatively narrower. Tail slightly attenuated, with the genital segment more prolonged. Caudal rami fully three times as long as broad, each with a single oblique row of small spinules across the dorsal face, outermost apical seta shorter than the innermost. Ovisacs slightly divergent. Anterior antennae short, and remarkably broad at the base, 8-articulate, the posterior ones less strongly built than in *P. phaleratus*. Last pair of legs well defined, resembling in structure those in *Leptocyclops*. Anterior antennae in male remarkably short and stout.

Description of the Female.—The general shape of the body (see fig. 5) appears comparatively less robust than in the preceding species, the anterior division being far less expanded and, seen dorsally, rather regularly oval in outline, with the greatest width about in the middle. The cephalic segment is comparatively large, occupying rather more than half the length of the anterior division, and is gradually contracted anteriorly, with the front narrowly rounded. The lateral corners of the 3 succeeding segments are somewhat projecting behind. The last segment is comparatively short but rather broad, with the lateral parts somewhat produced and clothed at the tips with fine spinules.

The tail about equals in length $\frac{2}{3}$ of the anterior division, and appears somewhat less strongly built than in *P. phaleratus*, tapering gradually behind. The genital segment is somewhat dilated at the base, and considerably exceeds the length of the 2 succeeding segments combined. The seminal receptacle (see fig. 14) is comparatively of simple structure and transversely oval in shape. The caudal rami (see fig. 15) are much more produced than in the preceding species, being nearly as long as the 2 last caudal segments combined, and fully three times as long as broad. They are of linear shape and scarcely at all divergent, each ramus having across the dorsal face a single oblique row of small spinules. The apical setae are rather unequal in length, the 2 middle ones being, as usual, much longer than the other 2, the inner of them attaining the length of the tail. The

innermost apical seta is a little longer than the outermost, but much thinner. The bristle of the outer edge is very small and attached at a short distance from the tip.

The ovisacs (see fig. 5) are of oval shape, and less closely appressed to the sides of the tail than in the preceding species. They contain only a limited number of ova.

The anterior antennae (fig. 6) are very short and stout, scarcely exceeding half the length of the cephalic segment, and are remarkably expanded at the base. They are only composed of 8 joints rather densely clothed with setae, some of which are distinctly ciliated. Of the joints the first 2 are somewhat lamellar, and less sharply defined from each other than the succeeding joints, which are of rather unequal size, the 4th joint being much the largest.

The posterior antennae (fig. 7) are comparatively less strongly built than in *P. phaleratus*, but of a very similar structure, the terminal joint being much shorter than the preceding one.

The 2 pairs of maxillipeds (figs. 8 and 9) appear somewhat poorly developed, in particular the posterior ones (fig. 9), on which the setae are very much reduced.

The natatory legs (figs. 10–12) have the basal part rather broad, and fringed outside with small denticles. The rami are, however, comparatively narrow, though well chitinised, and somewhat unequal in length, the inner one projecting distinctly beyond the outer. The 2 proximal joints of the latter ramus are, like the basal part, fringed with small spinules on the outer edge, and the terminal joint is in the 3 anterior pairs armed with 3 outer-edge spines. The inner ramus of these pairs is distinguished by the last 2 joints being produced at the outer corner to a sharp spiniform process.

The 1st pair of legs (fig. 10) are, as usual, somewhat smaller than the others, and have a rather strong deflexed spine at the inner distal corner of the basal part, wanting, moreover, an apical spine on the outer ramus. The inner ramus is remarkably slender, with the terminal joint comparatively narrower than on the other pairs and the apical spine more produced.

The 4th pair of legs (fig. 12) differ from the others by the want of one of the outer-edge spines on the terminal joint of the outer ramus, as also by the last 2 joints of the inner ramus not being remarkably produced at the outer corners. The terminal joint of this ramus has, moreover, as usual, only 2 setae inside, whereas at the tip 2 spines of unequal length are attached, flanked by 2 dentiform processes.

The last pair of legs (fig. 13) are very small, but pretty well defined

from the segment, and on the whole rather similar in structure to those in the genus *Leptocyclops*, each leg having the form of a somewhat trigonal lamella tipped with a thin bristle, and, moreover, provided outside with a similar bristle, inside with a strong deflexed spine coarsely denticulated along the outer edge.

The *male* (fig. 16) is of somewhat smaller size than the female, but of a rather similar shape of the body, the tail being, however, somewhat more produced in relation to the anterior division, and, as usual, composed of 5 well-defined segments.

The anterior antennae (fig. 17) are very strongly built, though, as compared with those in the preceding genera, of a rather short and clumsy appearance. The proximal section is composed of 6 well-defined joints, the 1st of which is much the largest, and provided about in the middle of the anterior edge with a peculiarly transformed, somewhat lamellar spine, obtuse at the tip, and fringed with coarse cilia. The remaining joints of this section are all of them very short and somewhat projecting behind in the form of small rounded lobules. The middle section is considerably tumefied and oval in shape, containing a very strong muscle, which joins the terminal section by a highly chitinised tendon. It is, as usual, composed of 4 joints, the 2nd somewhat cup-shaped, the 4th obtusely blunted at the end and larger than the others. Anteriorly this section exhibits several irregular rounded lobes, and is armed with 3 coarse more or less curved spines. The terminal section has the appearance of a short curved claw, but is in reality, as in the other *Cyclopidæ*, composed of 2 joints, the distal of which, however, is very small and spiniform.

The other appendages are exactly of same structure as in the female.

Remarks.—In the outward appearance the present form looks rather like the European species, *P. affinis*, G. O. Sars. It is, however, essentially distinguished both from this and the preceding species by the very different structure of the anterior antennae, which on the other hand is almost precisely as in *P. fimbriatus* (Fischer). On this cause it has indeed been considered by Dr. Schmeil as only a variety of that species. Yet its specific distinctness appears to me to be evident, as the shape of the caudal rami is very conspicuously different in these two forms.

Occurrence.—Several specimens of this form, almost all of the male sex, occurred in a sample taken by Dr. Purcell from a pond at Fishhoek, Cape Peninsula. In addition to the occurrence of this species in

Europe and South Africa, I have recorded it from another widely distant locality, viz. from one of the Pacific isles (Hawaii).

CRYPTOCYCLOPS, n. g.

Remarks.—This new genus is proposed to include those species of the old genus *Cyclops* in which the rami of all the natatory legs are only composed of 2 joints by the complete fusion of the 2 outer ones. True, in some few species still retained in the genus *Cyclops* (sens. strict.), a somewhat similar reduction of the rami is observed in one or other of the foremost pairs of legs; but in none of these species the reduction extends to the 2 posterior pairs, which in all of them are normally developed, with distinctly 3-articulate rami. Another character distinguishing the present genus is the extremely rudimentary condition of the last pair of legs, which have the form of insignificant rod-like appendages, easily escaping attention by their small size. In all the species, moreover, a very conspicuous slender, somewhat recurved seta is found attached to the lateral corners of the last pedigerous segment. The genus seems to be rich in species. In addition to the 2 first-described species, *C. varicans* and *bicolor*, the *Cyclops gracilis* of Lilljeborg ought to be adduced to this genus, and not, as formerly opined by me, to the genus *Mesocyclops*. Of the several Cyclopids recorded by the present author from the great Central African lakes, no less than five species are quite certainly referable to this genus, viz. *C. attenuatus*, *varicans*, *exiguus*, *Cunningtoni*, and *pachycomus*, and in the present account are added four apparently new species from South Africa.

18. Cryptocyclops assimilis, n. sp.

(Plate XV, figs. 1–8.)

Distinctive Characters.—Length of female, 1·10 mm. Body elongate, pyriform in shape, with the cephalic segment considerably dilated in front; lateral corners of the 3 succeeding segments rounded off. Last segment rather broad, with the seta of the outer corners well developed. Genital segment comparatively large, with the anterior half conspicuously dilated. Caudal rami rather produced, exceeding in length the last 2 segments combined, seta of inner corner shorter than that of the outer, bristle of outer edge somewhat remote from the apex. Anterior antennae 12-articulate, 1st, 3rd, and 7th joints the largest. Natatory legs with the distal joint of inner ramus much

broader than in *C. varicans*; apical spine of this ramus in 1st pair moderately strong and slightly procurved; 4th pair almost as strongly built as the preceding pairs, apical spines of inner ramus unequal in length. Last pair of legs rod-like, with a minute spinule inside the apical bristle.

Description of the Female.—The body (see fig. 1) is somewhat elongate and pronouncedly pyriform in shape, being rather broad in front and gradually tapered behind. The cephalic segment is considerably tumefied and broadly rounded off anteriorly, occupying a little more than half the length of the anterior division. The lateral lobes of the 3 succeeding segments are scarcely at all projecting and obtusely rounded off at the tips. The last segment is rather broad, with the lateral corners somewhat produced and each tipped with a slender gently recurved seta.

The tail somewhat exceeds half the length of the anterior division, and has the genital segment comparatively large, being conspicuously expanded in its anterior half. The caudal rami (see fig. 8) are narrow linear in shape and rather produced, being fully four times as broad as long and considerably exceeding in length the last 2 segments combined. The apical setae are very unequal in length, the 2 middle ones being, as usual, well developed and distinctly jointed at the base, whereas the other 2 are much shorter, that attached to the inner corner being in particular very small, and nearly attaining the length of that on the outer corner. The bristle of the outer edge is rather remote from the apex, being attached at about the posterior 3rd part of the ramus.

The ovisacs were wanting in all the specimens examined.

The anterior antennae (fig. 2) are comparatively short, scarcely attaining the length of the cephalic segment, and gradually taper distally. They are only composed of 12 joints clothed in front with scattered setae. The mutual relation of the joints is somewhat different from that observed in *C. varicans*, the type of the genus. In the present species the 1st, 3rd, and 7th joints are much the largest.

The posterior antennae (fig. 3) do not exhibit any noticeable particularity in their structure, and the same is also the case with the oral pieces.

The natatory legs (figs. 4 and 5), on the other hand, are highly distinguished by their unusually short and clumsy appearance, both rami in all of them being only composed of 2 joints, the proximal one quite short, the distal one more than twice as large and in reality answering to the 2 outer joints in other Cyclopidae combined. In so far

the structure of the legs in the present genus agrees with that found in still immature specimens of other *Cyclopidae*. The rami are in all the pairs of about equal size, the outer one differing, as usual, from the inner by its armature of spines outside. In the 3 anterior pairs 4 such spines are counted, one of them being attached to the proximal joint, the other 3 to the distal joint. The inner ramus of these pairs has only a single spine attached to the tip and accompanied inside by a seta.

The 1st pair of legs (fig. 4) are, as usual, somewhat smaller than the others, and differ, moreover, from them in a quite similar manner to that mentioned in the preceding Cyclopids, viz. by the presence of a deflexed spine on the inner corner of the basal part, and by the want of a true apical spine on the outer ramus. The inner ramus is distinguished by the comparatively strong development of the apical spine, which is considerably produced and somewhat procurved at the end.

The 4th pair of legs (fig. 6) are almost as strongly built as the next preceding ones, but differ in the want of one of the outer-edge spines on the distal joint of the outer ramus, as also of the seta inside the proximal joint. The inner ramus, too, has only 3 setae inside the distal joint, but 2 well-defined spines of unequal length on the tip. The shape of this joint is in all the pairs conspicuously different from that in the type species, being considerably broader, with the outer-edge seta more remote from the apex.

The last pair of legs (see fig. 7) are extremely small and rudimentary, each consisting of a thin rod-like joint attached to the hind edge of the corresponding segment and tipped with a small bristle accompanied inside by a minute spinule.

Remarks.—The present form is apparently nearly allied to the typical species, *C. varicans*, G. O. Sars, but is of considerably larger size, differing, moreover, somewhat in the general shape of the body, in the more produced caudal rami, and in the shape of the natatory legs.

Occurrence.—Some specimens of this form, all of the female sex, were found in a sample taken by Dr. Purcell from a pond on the Cape Flats.

19. Cryptocyclops crassipes, n. sp.

(Plate XV, figs. 9–14.)

Distinctive Characters.—Length of female, 0·80 mm. Body shorter and stouter than in the preceding species, with the cephalic segment less tumefied. Lateral corners of the 3 succeeding segments some-

what projecting behind. Genital segment gradually tapered distally. Caudal rami less produced than in the preceding species, with the innermost apical seta longer than the outermost, bristle of outer edge not far remote from the apex. Anterior antennae 11-articulate, 1st and 4th joints the largest. First pair of legs with the apical spine of inner ramus remarkably strong and distinctly procurved. Fourth pair of legs less strong than the others, with the distal joint of inner ramus attenuated, apical spines well developed.

Description of the Female.—The body (see fig. 9) appears on the whole rather shorter and stouter than in the preceding species, with the anterior division, seen dorsally, more regularly oval in outline. The cephalic segment is rather large, being almost twice as long as the remaining part of this division, but appears less tumefied than in the said species. The 3 succeeding segments are very short and densely crowded, with the lateral corners somewhat projecting behind. The last segment is about twice as broad as long, and carries on each side the slender curved seta characteristic of the genus.

The tail scarcely exceeds half the length of the anterior division and gradually tapers distally. The genital segment is less expanded in its anterior part than in the preceding species, and more evenly tapered behind. The caudal rami (fig. 14) are less produced, not nearly attaining the length of the 2 preceding segments combined, and scarcely more than twice as long as broad. The mutual relation of the apical setae is also somewhat different, that attached to the inner corner being more than twice as long as that on the outer. The bristle of the outer edge is rather small and not far remote from the apex.

The ovisacs (see fig. 9) are comparatively small and oval in shape, being only slightly divergent.

The anterior antennae (fig. 10) are comparatively shorter than in the preceding species, and apparently only composed of 11 joints. The mutual relation of the joints differs conspicuously from that in the said species, and more agrees with that in *C. varicans*.

The natatory legs (figs. 11–13) are on the whole built on the same type as in the preceding species, yet exhibiting, on a closer comparison, some well-marked differences in their details.

The 1st pair of legs (fig. 11) are in particular distinguished by the extraordinary coarse development of the apical spine on the inner ramus, this spine being, moreover, of a dark corneous colour, so as to be easily perceived even in the intact animal projecting below.

The 2 succeeding pairs of legs (fig. 12) are remarkably strongly built, with the spines of the outer ramus unusually coarse.

The 4th pair of legs (fig. 13), however, are conspicuously more feeble in structure, with the rami comparatively rather narrower than in the other pairs, the distal joint of the inner ramus being in particular much contracted towards the end. The apical spines of this joint are well developed, though, as usual, somewhat unequal in length.

The last pair of legs are still more rudimentary than in the preceding species, but apparently of a similar structure.

Remarks.—This form is perhaps still more closely related to *C. varicans* than the preceding one, but its specific distinctness from either of them cannot in my opinion be questioned. The most characteristic feature of the species refers to the extraordinary development of the apical spine on the inner ramus of the 1st pair of legs, and indeed the specific name is proposed in allusion to this particularity.

Occurrence.—Some specimens of this form were picked up from samples taken by Dr. Purcell in ponds on the Cape Flats.

20. Cryptocyclops caudatus, n. sp.

(Plate XV, figs. 15–20.)

Distinctive Characters.—Length of female, 0·67 mm. Body slender and attenuated, with the anterior division only slightly dilated and the lateral corners of the segments rounded off. Last pedigerous segment comparatively small. Tail considerably produced, with the genital segment conspicuously contracted at the base, but immediately behind the contraction considerably bulging on each side. Caudal rami not much produced, innermost apical seta very small. Anterior antennae 10-articulate. Fourth pair of legs rather feeble, with only a single apical spine on the inner ramus.

Description of the Female.—In general appearance the body (see fig. 15) differs conspicuously from that in the two preceding species, being much more slender and attenuated, with the anterior division only slightly dilated. The cephalic segment somewhat exceeds in length the remaining part of this division, and is narrowly rounded in front. The 3 succeeding segments gradually diminish both in length and width, and have the lateral corners rounded off. The last segment is comparatively small, with the lateral parts only slightly produced, but tipped with the usual curved seta.

The tail is unusually slender and produced, attaining about $\frac{2}{3}$ of the length of the anterior division. The genital segment is of a very characteristic shape, being remarkably contracted at its origin, but immediately behind this contraction bulging considerably on each side; its ventral face appears also in this region rather protuberant. The caudal rami (fig. 20) are a little more than twice as long as broad, and are distinguished by the rudimentary condition of the innermost apical seta, which scarcely exceeds in length $\frac{1}{3}$ of the outermost.

Ovisacs were not present in any of the specimens examined.

The anterior antennae (fig. 16) are rather short and apparently only composed of 10 joints, though a slight indication to a subdivision of the 5th joint may be traced.

The natatory legs (figs. 17–19) agree in structure rather closely with those in the European species, *C. bicolor*, G. O. Sars. As in that species, the 4th pair (fig. 19) is much feebler than the others, with both rami remarkably narrow, and the spines of the outer one much reduced in size. The inner ramus has, moreover, only a single spine on the tip, and the basal part is blunted at the inner corner, with the edge minutely spinulose.

The last pair of legs are extremely small, each only provided with a single short bristle on the tip.

Remarks.—The present form seems to be rather closely related to *C. bicolor*, the structure of the several limbs being almost exactly as in that species. It is, however, at once distinguished by the much more slender form of the body, as also by the different shape of the genital segment and of the caudal rami. Another species may also here be mentioned, viz. that recorded by the present author from the Lake Tanganyika under the name of *Cyclops exiguus*, this form exhibiting a rather similar slender shape of the body to that here described. It is, however, of much smaller size, and, moreover, differs conspicuously in the structure of the genital segment.

Occurrence.—Only some few female specimens of this form have as yet come under my notice. They were picked up from a sample taken by Dr. Purcell from a pond on the Cape Flats.

21. Cryptocyclops inopinatus, n. sp.

(Plate XV, figs. 21–25.)

Distinctive Characters.—Length of female, 0·70 mm. Body moderately slender, with the anterior division oblong oval in shape. Last pedigerous segment more than twice as broad as long. Genital

segment gradually contracted behind. Caudal rami about the length of the last 2 segments combined, innermost apical seta very small, outer-edge bristle remote from the apex. Ovisacs large, appressed to the tail. Anterior antennae 11-articulate. Natatory legs comparatively less strong than in the other species, 4th pair with only a single apical spine on the inner ramus.

Description of the Female.—The body (see fig. 21) is not nearly so slender and elongated as in *C. caudatus*, but comparatively narrower than in the other 2 species here recorded, the anterior division, seen dorsally, being of a rather regular oblong oval shape, with the greatest width nearly in the middle. The cephalic segment is about twice as long as the 3 succeeding segments combined, and has the frontal part somewhat protruding. The succeeding segments are densely crowded, with the lateral corners scarcely projecting, except those of the penultimate segment. The last segment is of moderate size, with the lateral corners slightly produced and tipped with the usual curved seta.

The tail about equals in length $\frac{2}{3}$ of the anterior division, and gradually tapers distally. The genital segment is rather broad at the base, but contracts evenly behind, being about the length of the 3 succeeding segments combined. The caudal rami (see fig. 21) are of the usual narrow linear shape, and do not fully attain the length of the last 2 segments combined. The mutual relation of the apical setae is about as in *C. caudatus*, that attached to the inner corner being extremely small and rudimentary. The bristle of the outer edge is rather remote from the apex.

The ovisacs (see fig. 21) are comparatively large, of oblong oval shape, and closely appressed to the sides of the tail, each containing a somewhat limited number of ova.

The colour of the living animal is whitish pellucid, with a very faint yellowish tinge. The ovarial tubes with their several ramifications are easily traced through the transparent integuments, and the eye is very conspicuous by its bright red pigment and glistening lateral facets.

The anterior antennae (fig. 22) are composed of 11 distinctly defined joints clothed with rather coarse and somewhat unequal setae. Of the joints, the 1st, 3rd, and 7th are distinctly larger than the others.

The natatory legs (figs. 23–25) are comparatively of somewhat smaller size than in the other species, but built on the very same type. The 4th pair (fig. 25) appear, however, less reduced than in

C. caudatus, though, as in that species, having only a single slender apical spine on the inner ramus.

The last pair of legs exhibit a quite similar rudimentary condition as in the said species.

The *male* is of rather smaller size than the female, and has the body considerably more slender. It is, moreover, easily recognised by the transformed anterior antennae and by the tail being composed of 5 segments.

Remarks.—The present form is apparently nearly allied to *C. caudatus*, yet differing conspicuously in the general shape of the body, as also in that of the genital segment. It is also of somewhat larger size.

Occurrence.—The present form developed rather plentifully in a small aquarium prepared with mud kindly forwarded to me from the South African Museum, and taken by Mr. Barnard from a swamp in South-West Africa. The mud was not very productive, but yet yielded a few things of particular interest, among them the present Cyclopid. At first only a solitary nearly fully-grown specimen appeared in my aquarium. The specimen was left for further observation and was carefully watched every day. After some time it became laden with large ovisacs filled with the usual kind of thin-skinned ova, from which the Nauplii soon escaped, rapidly growing to mature specimens of both sexes. These, propagating in the usual manner, gave rise in their turn to succeeding generations, the result being that my aquarium at last abounded with specimens of this Cyclopid in different stages of development.

This is the first instance that I have succeeded in breeding *Cyclopidae* from dried mud. Indeed, I had formerly regarded such a breeding to be quite impossible, because no true resting ova, like those not unfrequently met with in the *Diaptomidae*, are produced at all by any form of the present group of *Copepoda*. Of course I was not a little puzzled by the development of the present Cyclopid in my aquarium. However, after having read the interesting observations made by Mr. Youday on North American *Cyclopidae*, I find a quite satisfactory explanation of the present case. According to the said distinguished author, in shallow swamps which have become completely dried up, specimens of Cyclops are occasionally found enclosed within a tight envelope or cyst, evidently formed to protect the animal against exsiccation, and thus to ensure its life in a latent or resting condition, until the swamps are again filled with water.

Now, it is very likely that the specimen at first observed in my

aquarium was in reality such an encysted individual, which happened to be included in the mud, and which revived in the aquarium, afterwards accomplishing its further development and multiplying in the usual manner. It may be assumed that in every case the encysted specimens are nearly fully-grown females, which have previously been fecundated, and thus are adapted to produce new generations of specimens, to ensure the continued existence of the species.

Division HARPACTICOIDA.

Fam. CANTHOCAMPTIDAE.

Gen. NITOCRA, Boeck.

22. Nitocra dubia, n. sp.

(Plate XVI, figs. 1–10.)

Distinctive Characters.—Length of female, 0·50 mm. Body not very slender, subcylindrical in shape. Rostre very small. Anal opercle and posterior edge of last caudal segment coarsely dentate. Caudal rami short, quadrangular. Anterior antennae 8-articulate, clothed with long curved setae, terminal part almost as long as the basal one. First pair of legs scarcely prehensile, the inner ramus being almost straight, with the outer 2 joints simple and, combined, longer than the 1st. Last pair of legs with the distal joint conically produced, inner expansion of proximal joint short, truncated at the end.

Description of the Female.—The body (see figs. 1 and 2) is comparatively less elongate than in most other species of the present genus, and of short cylindrical shape, with the anterior division only slightly broader than the posterior, and not very sharply marked off from it. The cephalic segment about equals in length the 3 succeeding segments combined, and appears, in the dorsal view of the animal, obtusely rounded anteriorly, exhibiting, however, in the middle a very small narrow conical rostrum, which projects between the insertions of the anterior antennae. The lower edges of this segment are remarkably inflexed in the middle and broadly rounded off behind (see fig. 2). The 3 succeeding segments are almost of equal size, and have the lateral lobes closely appressed to the sides of the body, each terminating behind in an obtuse corner. The last segment is rather short, but nearly as broad as the preceding one.

The tail only slightly exceeds half the length of the anterior division,

and is of almost uniform width throughout. It is composed of the usual number of segments, all armed at the end laterally with rows of small denticles. The genital segment is about the length of the 2 succeeding ones combined, and shows slight trace of a subdivision in the middle. The last segment (see fig. 10) is slightly incised in the middle and somewhat obliquely truncated laterally, being armed on each side with a curved transverse row of coarse spinules. The anal opercle is likewise fringed with spinules of a similar kind. The caudal rami are short and rather widely apart, subquadrangular in shape, and armed with several small spinules, both dorsally and laterally. The 2 middle apical setae are well developed, though rather unequal in length, the inner one being fully twice as long as the outer. The other setae are very thin, hair-like.

The anterior antennae (fig. 3) do not attain the length of the cephalic segment, and taper gradually towards the end. They are each composed of 8 joints richly clothed with rather long and curved setae, and grouping themselves into 2 well-marked sections, a basal and a terminal, each comprising 4 joints. The 2nd basal joint is much the largest and considerably dilated, whereas the 3rd joint is comparatively small. The 4th joint is more than twice as long, and projects at the end anteriorly to a short prominence carrying a slender sensory filament accompanied by 2 unequal setae. The joints of the terminal section are not very different in size and rather narrow, the last carrying, in addition to the setae, a short sensory filament.

The posterior antennae (fig. 4) are comparatively small, though built on the usual type, the inner ramus being abruptly curved and armed on the distal joint with a number of strong spines and with 3 or 4 geniculated setae. The outer ramus, as in the other species of the present genus, is very small, and only consisting of a single somewhat lamelliform joint edged with 3 subequal setae.

The mandibles and maxillae were not sufficiently made out, but their structure seems to be that usually met with.

The anterior maxillipeds (fig. 5) are rather poorly developed, being only provided with a single small bisetose lobe inside the claw-like terminal joint.

The posterior maxillipeds (fig. 6) are also comparatively small, but of quite normal structure, terminating, as in most other Harpacticoida, in a subcheliform hand.

The 1st pair of legs (fig. 7) differ conspicuously in their structure from those in the other known species, in particular as regards the

inner ramus, which is far less strongly built and scarcely at all prehensile. The proximal joint of this ramus is only slightly produced and of oblong oval shape, being, like the 2 succeeding joints, provided inside near the end with a plumose seta. The outer part of the ramus, comprising the last 2 joints, is not, as in the other species, abruptly bent upon the proximal joint, but extends in about same line with it, and the strong apical claw found in those species is replaced by a quite ordinary spine, accompanied inside with a slender geniculated seta. The outer ramus is a little shorter than the inner, and on the whole built on the same type as in the other species.

The 3 succeeding pairs of legs (fig. 8) are very slender, with the rami narrow and rather unequal in length, the outer one being much the longer. All the 3 joints of this ramus are fringed outside with small spinules in addition to the usual spines, 4 of which belong to the terminal joint. The setae of the inner edge are rather reduced, one of them, however, attached near the tip being in the 4th pair rather strong and excessively prolonged, with the edges densely spinulose (see fig. 8). The inner ramus is of much feebler structure than the outer, and has the setae of the inner edge more uniformly developed, being, moreover, armed on the tip outside with a short spine.

The last pair of legs (fig. 9) are, as usual, pronouncedly lamellar in shape, and are each composed of 2 very dissimilar joints. The proximal joint sends off outside from a quite short base a narrow digitiform process tipped with a slender bristle, whereas inside it expands to a broad lamella extending to about the middle of the distal joint. The lamella is fringed outside with fine cilia, and carries on the obtusely truncated extremity 5 setae of somewhat unequal length. The distal joint is rather produced, extending to the end of the genital segment (see fig. 2), and is narrow oblong or somewhat lanceolate in outline, tapering to an obtuse point. Its inner edge is somewhat bulging near the base, and is here densely ciliated, whereas the outer edge is nearly straight. The joint is provided with 6 thin, more or less prolonged setae, 4 of which are attached to the outer edge, one particularly slender seta to the tip, and another, at a short distance from the latter, to the inner edge.

Remarks.—The above-described form is unquestionably referable to the genus *Nitocra* of Boeck, though it differs conspicuously from the usual type in the structure of the 1st and last pairs of legs. It may easily be recognised from the other species by its less slender shape of the body.

Occurrence.—A solitary female specimen of this form was found in a sample taken by Dr. Purcell from a pond on the Cape Flats.

Fam. HARPACTICIDAE.

Gen. HARPACTICUS, M. Edwards.

23. Harpacticus meridionalis, n. sp.

(Plate XVI, figs. 11–22.)

Distinctive Characters.—Length of female, 0·8 mm. General form of body resembling that in *H. litoralis*, though somewhat less robust. Anterior antennae less slender, with the basal part gradually tapered and the terminal part very short. Posterior maxillipeds scarcely as powerful as in the said species. First pair of legs almost precisely as in *H. littoralis* ; last pair, however, distinctly differing in shape, distal joint much narrower and tapering to an obtuse point, inner expansion of proximal joint obliquely rounded at the end, and provided with 5 somewhat unequal setae. Male differing from female in the usual manner.

Description of the Female.—The body (see figs. 11 and 12) is moderately slender, with the anterior division slightly depressed and, seen dorsally, regularly oblong oval in outline. The cephalic segment about equals in length the 3 succeeding segments combined, and has the posterior edge somewhat projecting dorsally (see fig. 12). It is quite evenly contracted in front and provided with a somewhat lamellar rostrum obtusely rounded off at the tip. This rostrum is sharply defined from the segment by a well-marked transverse suture, and appears to be to some extent mobile, being generally somewhat bent downwards, so as to be nearly hidden in the dorsal view of the animal (see fig. 11). The 3 succeeding segments are evenly vaulted dorsally, and have the lateral lobes rounded off at the tip. The last segment is rather broad, with the sides blunted.

The tail scarcely attains half the length of the anterior division, and is somewhat flattened, with the hind edges of the segments finely spinulose laterally. The genital segment occupies about half the length of the tail, and is, seen dorsally, almost quadrate in shape, with trace of an imperfect subdivision in the middle. The 3 succeeding segments rapidly diminish in size, the last one being very small, with the anal opercle unarmed. The caudal rami are extremely short, so as not easily to be perceived. The 2 middle apical setae are, how-

ever, considerably prolonged, in particular the inner one, which attains more than half the length of the body.

The anterior antennae (fig. 13) are comparatively less slender than in most of the other known species, scarcely exceeding half the length of the cephalic segment. They are, however, composed of the same number of joints, viz. 9, 4 of them belonging to the basal part, the other 5 to the terminal part. The former joints gradually taper distally, and are clothed at the end with bunches of densely crowded setae, the last of them being somewhat shorter than the preceding one, and carrying at the end the usual slender sensory filament together with some ordinary setae. The terminal part is comparatively short, not nearly attaining half the length of the basal one, and has the outer joints extremely small. The setae attached to this part form together a dense penicillate apical fascicle.

The posterior antennae (fig. 14) are rather largely developed, and apparently only consist of 2 segments very movably connected, and generally forming together an abrupt geniculate bend. The proximal segment, which in reality is formed by the complete fusion of the 1st joint of the inner ramus with the basal part, is rather expanded, and provided anteriorly with a curved seta. Opposite this seta is attached to the outer face of the segment a narrow biarticulate appendage, constituting the outer ramus and provided with 5 or 6 partly ciliated setae. The distal segment is rather constricted at the base, but gradually widens distally, and is armed outside with 3 coarse spines, followed at the inner corner by 3 geniculate, procurved setae.

The mandibles, maxillae, and anterior maxillipeds are of exactly same structure as in the other species, and need not therefore be described in detail.

The posterior maxillipeds (fig. 15) are moderately strong and, as usual, each composed of a rather slender basal part, to the end of which is very movably articulated a well-developed subcheliform hand. The propodus of the latter is somewhat swollen and of oval shape, with the palm defined in front by a well-marked projecting angle armed with densely crowded denticles. The apical claw, or dactylus, is very strong, falciform, and generally closely bent upon the propodus.

The 1st pair of legs (fig. 16) exhibit the peculiar structure characteristic of the present genus, being very unlike the succeeding pairs, and transformed to well-marked prehensile or preying organs. They are rather slender, projecting more or less to each side of the body. The basal part is somewhat lamellar, and composed of 2 well-defined

segments, the proximal of which has the outer edge densely fringed with slender spinules. The distal segment exhibits outside a well-marked ledge, to which a strong, closely denticulated spine is attached, and has at the inner corner another much thinner spine. The rami are very unequal in length, the outer one being almost twice as long as the inner and more or less bent outwards. It is composed of 3 joints, the first 2 narrow linear in shape and about of equal length, with the outer edge densely spinulose and, moreover, provided near the end with a short spine. The last joint of this ramus is very small, but armed with 4 highly chitinised hooked claws accompanied inside by a curved bristle. The inner ramus is only composed of 2 joints, the proximal one narrow linear and ciliated on both edges, the distal one quite short and armed with a strong curved claw accompanied by a thin bristle.

The 3 succeeding pairs of legs are natatory, and of quite normal structure.

The last pair of legs (fig. 17) are comparatively small, scarcely extending beyond the middle of the genital segment, but of the usual lamellar appearance. The distal joint is oblong or somewhat conical in shape, tapering gradually to an obtuse point, and is provided with 5 not very slender setae, that issuing from the tip being, however, rather thin and prolonged. The inner expansion of the proximal joint is comparatively broad and obliquely rounded at the end, being likewise provided with 5 setae.

The *male* (fig. 18) is about of same size as the female, but differs somewhat in the shape of the body, the anterior division being comparatively narrower and almost of equal width throughout, with the epimeral lobes more expanded laterally. The tail is, moreover, as usual, composed of 5 well-defined segments, and is comparatively narrower than in the female, with the 2 middle apical setae still more prolonged.

The anterior antennae (fig. 19) are powerfully developed and somewhat clavate in shape, being terminated by a much inflated, nearly globular part, sharply marked off from the preceding joints. In the interior of this part an exceedingly strong, transversely striated muscle is seen, acting upon a short hooked piece generally found closely bent upon the globular part, thus manifesting the pronouncedly prehensile nature of these appendages.

The posterior maxillipeds do not, as in some of the other species, exhibit any obvious difference in their structure from those in the female, and the 1st pair of legs also are of the very same appearance.

The 2 middle pairs of legs (figs. 20 and 21), on the other hand, are conspicuously transformed, and on the whole considerably more strongly built than in the female.

The 2nd pair of legs (fig. 20) have the outer ramus perfectly straight, with all the joints, but in particular the last, comparatively more robust than in the female. The inner ramus is somewhat narrower, and has the 1st joint remarkably prolonged, fully attaining the length of the other 2 combined. The 2nd joint, too, is distinguished by the outer corner being produced in the form of a mucroniform process running alongside the terminal joint. In the present species this process scarcely extends beyond the tip of the ramus, whereas in most of the other species it is very much longer.

The 3rd pair of legs (fig. 21) are exceedingly powerfully developed, with the outer ramus remarkably thickened and somewhat curved inwards. All the joints on this ramus are conspicuously expanded and highly chitinised, with the spines much coarser than in the female, whereas the setae of the inner edge are much reduced. It is very probable that these legs may assist the anterior antennae in getting hold on the female during copulation.

The last pair of legs (see fig. 22) are rather unlike those in the female and of much smaller size, with the proximal joint not at all expanded inside. The distal joint is somewhat spatulate in shape, and is armed at the end with 3 coarse spines, followed at the inner corner by 2 thin bristles.

Remarks.—The present form is apparently closely allied to the European species, *H. littoralis*, G. O. Sars, but is rather inferior in size, and, moreover, differs conspicuously in the structure of the anterior antennae and of the last pair of legs in the female.

Occurrence.—Some few specimens of this form were found in a small tube sent to me, together with other samples from the South African Museum. I am, however, unable to indicate the locality where the specimens were taken, as the writing on the label in the tube had been quite effaced by the action of the preserving fluid (formol). Most probably the specimens were taken from some brackish pool. It should, however, be here noted that a true fresh-water species of this otherwise marine genus has been recorded by the present author from the great Siberian lake Baikal.

EXPLANATION OF THE PLATES.

Plate V.

Lovenula falcifera (Lovén). ♀

FIG.

1. Adult ovigerous female, viewed dorsally.
2. Same, without the ovisac, but with a spermatophore adhering to the genital segment; seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Extremity of tail, with the caudal rami, dorsal view.

Plate VI.

Lovenula falcifera (continued). ♂

1. Adult male, dorsal view.
2. Same, right anterior antenna.
3. Extremity of same antenna, more highly magnified.
4. Same, last pair of legs.
5. Same, extremity of tail, with the caudal rami, dorsal view.

Lovenula barnardi, n. sp.

6. Adult ovigerous female, dorsal view.
7. Same, without the ovisac, seen from left side.
8. Same, leg of last pair.
9. Last pair of legs of male.

Plate VII.

Paradiaptomus lamellatus, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisac, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.

FIG.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Adult male, seen from right side.
13. Same, last pair of legs.
14. Same, extremity of tail, with the caudal rami, dorsal view.

Plate VIII.

Diaptomus capensis, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisac, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible, with palp.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of last pair.
12. Last pair of legs of male.

Diaptomus rigidus, n. sp.

13. Adult ovigerous female, dorsal view.
14. Same, without the ovisac, seen from left side.
15. Frontal part of head, more highly magnified, lateral view.
16. Leg of last pair.
17. Last pair of legs of male.
18. Extremity of tail, with the caudal rami, dorsal view.

Plate IX.

Diaptomus purcelli, G. O. Sars.

1. Adult ovigerous female, dorsal view.
2. Same, without ovisac, seen from left side.
3. Anterior antenna.
4. Leg of 3rd pair.
5. Leg of last pair.
6. Adult male, seen from right side.
7. Same, last pair of legs.
8. Same, extremity of tail, with the caudal rami, dorsal view.

Diaptomus congruens, n. sp.

9. Adult ovigerous female, dorsal view.
10. Same, without the ovisac, seen from left side.
11. Leg of last pair.
12. Distal part of right anterior antenna of male.
13. Last pair of legs of same.

Plate X.

Cyclops tenuisaccus, n. sp.

FIG.

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Lip.
5. Mandible.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 3rd pair.
11. Leg of 4th pair.
12. Leg of last pair, more highly magnified.
13. Extremity of tail, with the caudal rami.

Mesocyclops obsoletus (Koch).

14. Adult ovigerous female, dorsal view.
15. Leg of 1st pair.
16. Leg of 4th pair.
17. Leg of last pair.
18. Extremity of tail, with the caudal rami.

Mesocyclops neglectus, G. O. Sars.

19. Adult ovigerous female, dorsal view.
20. Leg of 4th pair.
21. Leg of last pair.
22. Extremity of tail, with the caudal rami.

Plate XI.

Mesocyclops oblongatus, n. sp.

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisacs, seen from left side.
3. Frontal part of head, seen from the ventral face.
4. Genital segment, together with the adjoining part of the anterior division of body, ventral view.
5. Distal part of tail, with the caudal rami, dorsal view.
6. Anterior antenna.
7. Posterior antenna.
8. Anterior maxilliped.
9. Posterior maxilliped.
10. Leg of 1st pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.
13. Leg of last pair.
14. Adult male, dorsal view.
15. Same, anterior antenna.

Mesocyclops major, n. sp.

FIG.
16. Adult female, dorsal view.
17. Leg of 1st pair.
18. Leg of 4th pair.
19. Leg of last pair.
20. Extremity of tail, with the caudal rami.

Plate XII.

Leptocyclops sublaevis, n. sp.

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Leg of 1st pair.
5. Leg of 3rd pair.
6. Leg of 4th pair.
7. Leg of last pair.
8. Adult male, dorsal view.
9. Same, anterior antenna.
10. Extremity of tail (female), with the caudal rami.

Leptocyclops prasinus (Fischer).

11. Adult ovigerous female, dorsal view.
12. Same, without the ovisacs, seen from left side.
13. Anterior antenna.
14. Posterior antenna.
15. Leg of 1st pair.
16. Leg of 2nd pair.
17. Leg of 3rd pair.
18. Leg of 4th pair.
19. Leg of last pair.
20. Extremity of tail, with the caudal rami.

Plate XIII.

Afrocyclops gibsoni (Brady).

1. Adult ovigerous female, dorsal view.
2. Same, without the ovisacs, seen from left side.
3. Anterior antenna.
4. Posterior antenna.
5. Mandible.
6. Maxilla.
7. Anterior maxilliped.
8. Posterior maxilliped.
9. Leg of 1st pair.
10. Leg of 2nd pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.

FIG.

13. Leg of last pair.
14. Genital segment, together with the last pedigerous segment, viewed from the ventral face.
15. Adult male, dorsal view.
16. Same, anterior antenna.
17. Same, leg of 2nd pair.
18. Same, tail together with last pedigerous segment, viewed from the ventral face.

Plate XIV.

Platycyclops phaleratus (Koch).

1. Adult ovigerous female, dorsal view.
2. Anterior antenna.
3. Lateral part of last pedigerous segment, with the corresponding rudimentary leg.
4. Extremity of tail, with the caudal rami, dorsal view.

Platycyclops poppei (Rehberg).

5. Adult ovigerous female, dorsal view.
6. Anterior antenna.
7. Posterior antenna.
8. Anterior maxilliped.
9. Posterior maxilliped.
10. Leg of 1st pair.
11. Leg of 3rd pair.
12. Leg of 4th pair.
13. Leg of last pair.
14. Genital and last pedigerous segments, ventral view.
15. Extremity of tail, with the caudal rami, dorsal view.
16. Adult male, dorsal view.
17. Anterior antenna of same.

Plate XV.

Cryptocyclops assimilis, n. sp.

1. Adult female, dorsal view.
2. Anterior antenna.
3. Posterior antenna.
4. Leg of 1st pair.
5. Leg of 3rd pair.
6. Leg of 4th pair.
7. Lateral part of last pedigerous segment, with the corresponding rudimentary leg and the lateral seta.
8. Extremity of tail, with the caudal rami.

Cryptocyclops crassipes, n. sp.

9. Adult ovigerous female, dorsal view.
10. Anterior antenna.
11. Leg of 1st pair.

FIG.
12. Leg of 3rd pair.
13. Leg of 4th pair.
14. Caudal ramus.

Cryptocyclops caudatus, n. sp.

15. Adult female, dorsal view.
16. Anterior antenna.
17. Leg of 1st pair.
18. Leg of 3rd pair.
19. Leg of 4th pair.
20. Extremity of tail, with the caudal rami.

Cryptocyclops inopinatus, n. sp.

21. Adult ovigerous female, dorsal view (drawn from life).
22. Anterior antenna.
23. Leg of 1st pair.
24. Leg of 3rd pair.
25. Leg of 4th pair.

PLATE XVI.

Nitocra dubia, n. sp.

1. Adult female, dorsal view.
2. Same, seen from left side.
3. Anterior antenna and rostrum, lateral view.
4. Posterior antenna.
5. Anterior maxilliped.
6. Posterior maxilliped.
7. Leg of 1st pair.
8. Leg of 4th pair.
9. Leg of last pair.
10. Extremity of tail, with the caudal rami, dorsal view.

Harpacticus meridionalis, n. sp.

11. Adult female, dorsal view.
12. Same, seen from left side.
13. Anterior antenna.
14. Posterior antenna.
15. Posterior maxilliped.
16. Leg of 1st pair.
17. Leg of last pair.
18. Adult male, dorsal view.
19. Same, anterior antenna.
20. Same, leg of 2nd pair.
21. Same, leg of 3rd pair.
22. Same, lateral part of last pedigerous segment, with the corresponding leg, and adjoining part of genital segment, with enclosed spermatophore.